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THE TECHNOLOGY ADMINISTRATION IN THE FISCAL YEAR 2000 BUDGET AND S. 795, FASTENER QUALITY ACT AMENDMENTS

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HEARING

BEFORE THE

SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION UNITED STATES SENATE

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

APRIL 21, 1999

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

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THE TECHNOLOGY ADMINISTRATION IN THE FISCAL YEAR 2000 BUDGET AND S. 795, FASTENER QUALITY ACT AMENDMENTS

WEDNESDAY, APRIL 21, 1999,

U.S. SENATE,
SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The subcommittee met, pursuant to notice, at 2;05 p.m. in room SR–253, Russell Senate Office Building, Hon. Bill Frist (chairman of the subcommittee) presiding.

Staff members assigned to this hearing: Floyd DesChamps and Elizabeth Prostic, Republican professional staff; and Jean Toal Eisen, Democratic professional staff.

STATEMENT OF HON. BILL FRIST, U.S. SENATOR FROM TENNESSEE

Senator FRIST. Good afternoon. Today, the Science, Technology, and Space Subcommittee will examine the Department of Commerce's Technology Administration fiscal year 2000 budget request, and the Fastener Quality Act. I want to welcome each of our witnesses to Capitol Hill, and thank you for participating in what I know will be a constructive and educational setting over the next couple of hours.

Two years ago, when we met in this very room to discuss the Technology Administration, I identified three simple truths. These truths I believe helped establish the link between Federal spending and results. They highlight the need to make those connections as clear and as direct and as powerful as possible.

Truth Number 1, research and development in science and education lead to advancements in innovation.

Truth Number 2, innovation has been the basis of our competitive edge, useful and defensive, and our extraordinary lifestyle that we all enjoy today. It is the cornucopia of modern America and really the envy of the world.

Truth Number 3, supporting Federal research and creating an environment that encourages private research and innovation are the bedrock upon which much of our national economy is built.

Last week, the subcommittee held a hearing on R&D funding throughout the Federal Government, and it is these programs which most forcefully affect activities at the beginning stage of that development process. Today, we will focus attention to activities at the end of the development cycle, the Technology Administration,

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the agency responsible for ensuring that technologies become commercialized.

The Technology Administration of the Department of Commerce plays a critical role in the development of our technological infrastructure. It is a key enabler that satisfies two of the previously mentioned simple truths. The Technology Administration works closely with industry to ensure a constant flow of technological advances and that they are enjoyed by the American public. This constant flow is also necessary to maintain our economic leadership and stability.

The Technology Administration is comprised of the Office of Technology Policy, the National Institute of Standards and Technology (NIST), and the National Technical Information Service (NTIS). Last year, in the Technology Administration Act of 1998, Congress created the Office of Space Commercialization. This was in response to the growing market and policy demands for Federal oversight in this important domain. The office has become the principal unit for coordination of space-related issues, programs, and initiatives within the Department of Commerce.

The act of last year also addressed four additional emerging areas that warrant involvement and leadership of NIST. First, Congress established a teacher science and technology enhancement program, whereby teachers would have the opportunity to gain exposure to Federal laboratories, and would be able to learn about the impact of science and technology on the economy and the overall quality of our lives. It is essential that we prepare our math and science teachers if we expect them to improve upon our students' performance in these critical areas.

The second provisions were included to establish the experimental program to stimulate competitive technology, whose purpose is to strengthen the technological competitiveness of those States that have historically received less Federal research and development funds than the majority of States.

Third, one of the most sought-after awards in industry today, the Malcolm Baldridge Award, which represents outstanding achievement in the area of quality, was extended to two fields that are very important to me, education and health care.

Finally, the Technology Administration Act of 1998 will expand the Federal support of NIST's popular manufacturing extension program beyond the sixth year of operation. This extension will deeply impact individual centers' ability to positively influence State and local manufacturers in all 50 States. The Department of Commerce, as a result of this action, has decreed 1999 the year of the small manufacturer.

The second part of our hearing today will focus on the Fastener Quality Act. On February 24 of this year, the Department of Commerce released its long-awaited report detailing the current state of the fastener industry and recommending revisions to the original act signed into law in 1990.

We have several participants here with us today who will testify on behalf of the 45,000 Americans who are involved in this $9 billion industry. They will reflect and offer insight into the impact of the Fastener Quality Act if implemented on June 24, and the recent legislation introduced to improve the certification process.

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The budget resolution that the House and Senate passed last week highlights the reality of our current fiscal environment. We must make tough choices to preserve the science and technology investment in our Nation's resources. Consistent and stable funding at the very minimum are essential for programs to succeed.

It is imperative that we recognize that to defend many of our science and technology programs we must do a better job of defining and explaining and promoting their value and impacts to the American public. It is widely accepted by the Nation's top scholars that technological advances are responsible for at least half of our Nation's economic growth and are the main reason for long-term economic expansion. Our country's future is dependent upon the success of Federal programs at the Technology Administration.

Briefly, for the procedures which most everybody in the room knows, the witness' entire testimony will be made a part of the official record. With that, I will turn to Senator Breaux.

[The prepared statement of Senator Frist follows:]

PREPARED STATEMENT OF BILL FRIST, U.S. SENATOR FROM TENNESSEE

Today the Science, Technology, and Space Subcommittee will examine the Department of Commerce's Technology Administration fiscal year 2000 budget request and the "Fastener Quality Act." I'd like to welcome each of our witnesses to Capitol Hill and thank you for participating in what I hope will be a constructive and educational session.

Two years ago when we met in this very room to discuss the Technology Administration, I identified three simple truths. These truths establish the link between federal spending and results. They highlight the need to make those connections as clear, direct and as powerful as possible.

Truth number one: research and development, science, and education lead to advancements in innovation.

Truth number two: innovation has been the basis of our competitive edge—peaceful and defensive—and our extraordinary lifestyle. It's the cornucopia of the modern America and the envy of the world.

Truth number three: funding federal research and creating an environment that encourages private research and innovation are the bedrock upon which much of our national economy is built.

Last week the subcommittee held a hearing on R&D funding throughout the federal government. It's these programs which most forcefully affect activities at the beginning stage of the technology development process. Today, we'll focus our attention towards activities at the end of the development cycle, the Technology Administration—the agency responsible for ensuring that technologies become fully commercialized.

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The Act also addressed four additional emerging areas that warrant the involvement and leadership of NIST. First, Congress established a Teacher Science and Technology Enhancement Program whereby teachers would have the opportunity to gain exposure to federal laboratories and would be able to learn about the impact of science and technology on the economy and the overall quality of our lives. It's essential that we prepare our math and science teachers if we expect them to improve upon our students' performance in these critical areas.

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Second, provisions are included to establish the Experimental Program to Stimulate Competitive Technology, whose purpose is to strengthen the technological competitiveness of those states that have historically received less federal research and development funds than the majority of states.

Third, one of the most sought after awards in industry today, the Malcolm Baldridge Award, which represents outstanding achievement in the area of quality was extended to education and health care.

Finally, the Technology Administration Act of 1998 will extend federal support of NIST's popular Manufacturing Extension Program beyond the sixth year of operation. This extension will deeply impact individual centers' ability to positively influence state and local manufacturers in all 50 states. The Department of Commerce, as a result of this action, has decreed 1999 as the "Year of the Small Manufacturer."

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The budget resolution that the House and Senate passed last week highlights the reality of our current fiscal environment. We must make tough choices to preserve the science and technology investment in our nation's resources. Consistent and stable funding, at the very minimum, are essential for programs to succeed. It's imperative that we recognize that in order to defend many of our science and technology programs, we must do a better job of defining and explaining their value and impacts to the American public.

It's widely accepted by the nation's top scholars that technological advances are responsible for at least one half of the nation's economic growth and are the main reason for long-term economic expansion. Our country's future is dependent upon the success of federal programs at the Technology Administration.

STATEMENT OF HON. JOHN B. BREAUX, U.S. SENATOR FROM LOUISIANA

Senator BREAUX. Thank you, Mr. Chairman, for promptly beginning the work of this Subcommittee, and I note that we are here better late than never. I think your opening comments were well-spoken. I think you have outlined the procedures for today.

You mentioned about next year being the year of the small manufacturers. I have a lot of small manufacturers who would like to become large manufacturers one day, and through the technology assistance that is provided through these various programs they will have an opportunity to do that. It is very important to the economy of this country and technology development in general.

So I am anxious to hear the witnesses present their testimony. I have a statement that I would ask be made a part of the record.

Senator FRIST. Without objection.

[The prepared statement of Senator Breaux follows:]

PREPARED STATEMENT OF HON. JOHN B. BREAUX, U.S. SENATOR FROM LOUISIANA

Today we are considering the FY 2000 budget for the Technology Administration and the reform of the Fastener Quality Act. Both issues are important to American industry and competitiveness. I thank the witnesses who will be testifying before us today. My colleagues and I look forward to hearing your remarks and discussing these vital issues with you.

Successful technology development, deployment and diffusion drive economic growth and are increasingly essential to US competitiveness. Given the central role that technology plays in the economic growth, all jurisdictions—federal, state and local—are concerned with creating and maintaining the conditions that are conducive to the development of new technologies and the adoption and diffusion of existing ones. The Technology Administration through its four constituent components, the Office of Technology Policy (OTP), the Office of Space Commercialization (OSC),

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the National Institute for Standards and Technology (NIST) and the National Technical Information Service (NTIS) has been instrumental in advancing American technological leadership through innovative programs that promote partnerships between state and local governments, universities, community colleges, non-profit organizations and the private sector.

The NIST is approaching one hundred years of support to industry, commerce, scientific institutions and all branches of government. American technological and business leadership in the world today is due in no small measure to the efforts of NIST. NIST has worked with industry to promote U.S. economic growth by advancing measurement, developing standards and applying technology. Abroad NIST has worked to encourage emerging nations to adopt American standards, thus making our products easier to market. At home, programs such as the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP) help develop and maintain American technological leadership by funding new technologies and making sure that American companies stay abreast of technological developments.

ATP has provided U.S. companies with funding for commercially relevant research and development ventures that private capital sources would be unlikely to finance. More than 120 technologies developed through ATP funding have been commercialized by industry. Most of these grants, including 68% in FY 98, went to small companies. More than 100 colleges and universities have shared in the program.

Through the Manufacturing Extension Partnership (MEP) NIST has created a nationwide network of services to assist smaller manufacturers in becoming globally competitive. The network of locally-run centers in all 50 states and Puerto Rico provide technical advice and consulting to small firms that may lag behind foreign competitors in technology and operations. MEP-assisted companies surveyed report benefits of $8 for every $1 that the federal government has invested in MEP Centers.

In most of the less-populated states, manufacturers and industries tend to be small which in turn means a limited industrial research base. These states are at a competitive disadvantage because they lack the critical mass necessary to develop industrial clusters. The Experimental Program to Stimulate Competitive Technology (EPSCoT) seeks to catalyze state efforts to remedy this disadvantage. EPSCoT encourages innovative non-profit and private sector initiatives that can spur a virtuous cycle of collaboration among universities, private companies and public sector agencies. This collaboration in turn improves a region's ability to anticipate and respond to changing economic conditions. There are 19 states eligible for EPSCoT grants, but only six have been funded so far. This innovative and successful program should be allowed to grow naturally so that all parts of the country can benefit and participate in the expansion of American technological leadership.

To ensure that the Technology Administration continues to be able to conduct state-of-the-art research necessary for advanced technology, we must invest in state-of-the-art research facilities. Breakthrough technologies are unlikely to come from technologically obsolete laboratories. The President's budget request includes much needed funds to undertake critical maintenance at NIST's 30 and 45 year old research facilities as well as the continued construction of the Advanced Measurement Laboratory.

NIST has played a central role in assuring public safety. The Fastener Quality Act enacted in 1990 requires that a NIST-accredited laboratory test or document all grade-marked fasteners that directly or indirectly reference a consensus standard to ensure that public safety is not jeopardized. However, the FQA provisions have never been implemented by regulation. In the intervening years, fastener manufacturing processes and technology have improved so much that the Department of Commerce recently concluded that problems are only a fraction of what they were in 1990. S. 795 of which I am an original cosponsor along with Senators McCain, Hollings, Frist and Burns, builds on NIST's work and restricts the FQA's coverage to high strength fasteners, delays requirements for use of accredited labs for two years, allows fraud in commercial transactions involving fasteners to be punished and allows for electronic record keeping.

Senator FRIST. Senator Rockefeller.

STATEMENT OF HON. JOHN D. ROCKEFELLER IV, U.S. SENATOR FROM WEST VIRGINIA

Senator ROCKEFELLER. Thank you, Mr. Chairman. I am less restrained than Senator Breaux. I am a passionate believer in everything we are talking about here today. As you lay the predicate for

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the importance of R&D, Mr. Chairman, that you can say 50 percent of our growth stems from innovation. There has been a reason for that, and those reasons come from thousands of little rivulets which turn into enormous rivers which flow by the State of Tennessee, and even Louisiana.

We do not have any big rivers in West Virginia, but NIST has always been good. It has always been a powerful instrument. It has always been essential to making us more competitive. NIST is not just measurements any more. It is making us do better on competitive technical services.

The ATP program announced the other day that it is no longer controversial, it is accepted. Well actually that probably is not true. It is accepted by those of us sitting here because we understand that you have to get into high risk, precompetitive research and development at some point. A lot of people cannot do that without something called ATP. We have to fight to make sure that the program stays very, very strong.

My views on the Manufacturing Extension Partnership program were buttressed by being in West Virginia on Monday and going to something called the Polymer Alliance Zone Conference. MEP has played a major, major part in getting businesses interested in this field.

EPSCoT—everybody knows my view on that. I will just fire a little shot across Mr. Bachula's bow here on EPSCoT. ESPCoT has been subjected to a substantial cut. There have been no grants that have issued from EPSCoT since December.

I hear rumors that unless there is enough noise made by its supporters that EPSCoT may disappear entirely. I do not know what Mr. Bachula's view is on this, but I certainly am interested in finding out, because EPSCoT is precisely a part of what the Chairman is talking about when he talks about technology being 50 percent of our economic growth. So those are some of the questions that I will want to ask, but everything we are doing here I support.

Thank you.

Senator FRIST. Thank you. With that, we will turn to our first panel, Mr. Gary Bachula, Acting Under Secretary for Technology Administration. He will be followed by Mr. Ray Kammer, Director of the National Institutes of Standards and Technology, and they will be addressing in part the President's fiscal year 2000 budget for the Technology Administration and the Fastener Quality Act. I thank both of you for joining us, and we will begin by Mr. Bachula.

STATEMENT OF GARY BACHULA, ACTING UNDER SECRETARY, TECHNOLOGY ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. BACHULA. Thank you, Mr. Chairman. It is always a pleasure to appear before this subcommittee. In addition to Ray Kammer, the Director of NIST, I am accompanied today by Kelly Carnes, who is the Deputy Assistant Secretary for Technology Policy and, in fact, is also the Assistant Secretary-designee. Her name is before this committee. And also Ron Lawson, who is the Director of the National Technical Information Service. They are in the audience.

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The Technology Administration's total fiscal year 2000 budget request is $746 million. Director Kammer will speak to the largest portion of that budget, the NIST request.

I would like to take a minute to talk about the economic context of technology and address the activities of the Office of the Under Secretary and the Office of Technology Policy, including the Office of Space Commercialization and the National Technical Information Service.

Mr. Chairman, the U.S. economy has been sizzling in the last several years. In fact, in the last quarter of 1998 it grew at 6 percent, a 2.2 percent productivity increase in 1998. It is clearly an innovation-driven boom occurring in a new global marketplace, and it is more than just a good business cycle, it is part of a fundamental economic transformation caused in great part by technological advances.

Harvard's Professor Michael Porter has said that the very nature of competition has changed. "Modern competition now depends on productivity, not on access to inputs or the scale of individual enterprises. Productivity rests on how companies compete, not on the particular fields they compete in. Companies can be highly productive in any industry, shoes, agriculture, or semiconductors, if they employ sophisticated methods, use advanced technology, and offer unique products and services. All industries can employ advanced technology, all industries can be knowledge-intensive," wrote Dr. Porter. The current economic payoffs from past Federal investments in science and technology, some that go back as long as 20 or 30 years ago, are enormous.

But this is no time to let up. We must sustain our investment in research if we are to sustain our economic growth. The most recent report by the private sector Council on Competitiveness warns that we are living off of past investments in R&D but not making new investments sufficient to sustain our economy into the future.

At one time, the Federal Government's investments in R&D were the whole ball game, literally about 70 percent of all the world's research and development. All though that share has shrunk, those investments remain very important. In addition to spending we also must continue to pay attention to policy issues that affect our ability to innovate and change. In the past year, the Office of the Under Secretary and the Office of Technology Policy have continued to have impact and to produce results in important areas affecting the ability of the private sector to innovate and grow.

Our report on environmental technologies was lauded by both environmental and business groups for its calls for new approaches to regulatory policy. Our analysis and advocacy on the issues of the skills and the availability of information technology workers provoked public debate, spurred new Federal, State, and local initiatives, and created new cooperation among the Departments of Education, Labor, and Commerce on the important issue of work force development.

Our efforts to coordinate the Government side of the Partnership for a New Generation of Vehicles continues to show progress, and next year we will reach a major milestone in that program where auto companies will unveil concept cars that demonstrate the very ambitious goal of 80 miles per gallon. This past year, as was noted,

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we successfully launched the Experimental Programs to Stimulate Competitive Technology, with EPSCoT funding seven projects in 10 rural States to help them promote technology-based economic development.

This year, we continue to work with the Congress on monitoring and making recommendations with respect to technology transfer legislation. A 1999 report will help guide our fiscal year 2000 activities in this area.

In addition to our biennial report, we will convene a series of roundtables with industry representatives to gain a better understanding of their experiences in working with Federal laboratories. Our goals in the Year 200 budget—we are asking for about $9 million—are to build upon our core programs and seek synergies among them. We will work with State governments in the Great Lakes area to help them assess the economic impact and the needs of small suppliers in an area of dramatic technological change in the automotive industry.

We will continue to monitor bottlenecks in the information technology electronic commerce sector, whether they be skilled workers, accounting standards, or regulatory issues, and work with the industry to identify policy solutions. We will increase our research and analysis of business climate issues that affect innovation in general, making recommendations for change when needed, and we will continue to advocate policies that encourage and enable a growing commercial space industry, including domestic launch and global positioning system issues.

Finally, Mr. Chairman, in fiscal year 2000, we seek an appropriation of $2 million for the National Technical Information Service. In the rapidly changing technical information arena, the impact of the Internet makes it no longer feasible for NTIS to subsidize the acquisition, organization, indexing, and preservation of federally funded technical information entirely out of its fees for products and services.

Preserving the 3 million existing documents, including some 60,000-plus new acquisitions each year, we believe is a public good, and we feel that that activity merits this budget request.

Mr. Chairman, I ask to go into the record a summary of the Technology Administration's fiscal year 2000 budget.

Senator FRIST. Without objection.

FY 2000 TECHNOLOGY ADMINISTRATION BUDGET HIGHLIGHTS

More than ever before, technological leadership is vital to the national interest of the United States. The nation's capability to harness the power and promise of leading-edge technologies will determine, in large measure, its prosperity, security, and global influence in the 21st century.

Leading economists estimate that technology accounts for as much as 50 percent of the nation's long-term economic growth. The study Technology, Economic Growth, and Employment: New Research from the Department of Commerce found that firms using advanced technologies are significantly more productive, pay higher wages, offer more secure jobs, and increase employment more rapidly than those that do not. But global competition is intensifying. Nations everywhere have recognized the link between technology and growth and are developing policies and programs to enhance industrial competitiveness and fuel technology-driven growth and job creation.

The Clinton Administration has sought to address these economic and competitive realities by developing, in partnership with American industry, policies and programs that enhance U.S. competitiveness in the global marketplace and maximize

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technology's contribution to national economic growth, job creation, and quality of life. The focal point for these efforts is the Technology Administration (TA), the primary civilian technology agency working with industry to improve U.S. competitiveness. TA serves as an advocate for U.S. innovation and industrial competitiveness within the Department of Commerce, other federal agencies, and national and international fora. It carries out this role through:

- the leadership of the Under Secretary;
- the Office of Technology Policy's analysis, formulation, and advocacy of policies that maximize the contribution of technology to economic growth;
- the programs of the National Institute of Standards and Technology, which maintain and improve the nation's measurement and standards infrastructure; foster the development, adoption, and diffusion of new technologies; and facilitate the adoption of leading business practices; and
- the collection and dissemination of technological information by the National Technical Information Service.

To continue the successful implementation of this civilian technology agenda in fiscal year (FY) 2000, the President requests:

OFFICE OF THE UNDER SECRETARY/OFFICE OF TECHNOLOGY POLICY

Total funding requested: $9 million

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Total funding requested: $735 million

NATIONAL TECHNICAL INFORMATION SERVICE

Total funding requested: $2 million

Specific budget proposals are described on the following pages.

US/OTP Budget Highlights

SUMMARY AND JUSTIFICATION

President Clinton requests $9 million for the Office of the Under Secretary for Technology and the Office of Technology Policy (US/OTP). This request supports US/OTP's mission and functions necessary to meet critical Administration and Congressional civilian technology priorities. US/OTP is responsible for working with the private sector to analyze, develop coordinate, and advocate national policies that maximize technology's contribution to U.S. competitiveness, economic growth, the creation of high-wage jobs, and improvements in living standards for all Americans.

The request, an overall decrease of $523,000 from the FY 1999 appropriation, will support the Under Secretary in overseeing the Technology Administration's three operating units (OTP, the National Institute of Standards and Technology, and the National Technical Information Service), coordinating several interagency civilian technology efforts, and providing analysis and leadership in other important technology-related domestic and international activities. The US/OTP budget also supports the Office of Space Commercialization (OSC).

In FY 2000, US/OTP will continue to provide leadership and analytical activities—in close partnership with U.S. industry, federal research agencies, and the national laboratories—to maximize taxpayers' return on their investment in federal research and development (R&D). The FY 2000 budget proposal includes a $1 million increase to core programs to enable US/OTP to:

- expand analysis and advocacy of current and proposed economic, technology, and regulatory policies of the federal and state governments and research their impact on innovation and U.S. competitiveness;
- build on successful efforts to help the nation meet the rapidly growing demand for information technology (IT) workers; and
- build on existing programs to help the automotive supplier base—and states whose economies are linked closely to the automotive sector—seize the opportunities presented by the rapid development of new automotive technologies.

The proposal also requests a decrease of $1.7 million for the Experimental Program to Stimulate Competitive Technology (EPSCoT), which is designed to foster the development of indigenous technology assets in states and regions traditionally under-represented in federal R&D funding. No new grants will be made in FY 2000; instead, a full-scale evaluation of EPSCoT will be undertaken.

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US/OTP PERFORMANCE

For more than 15 years, OTP (as well as its predecessor, the Office of Productivity, Technology and Innovation) has been an important voice for industry, working with other federal agencies, Congress, and international groups to foster U.S. innovation and competitiveness. For example, as the competitive environment has changed, US/OTP has served as a forceful advocate for improvements in the laws and regulations governing the commercialization of federal research, including removing barriers to government-industry cooperative research, ensuring effective protection of intellectual property, and expanding small business access to the federal research enterprise.

OTP's long track record of success continued during the past year:

- In partnership with state and local governments, US/OTP completed the design of the EPSCoT grant process and conducted a successful competition in which seven proposals were selected to receive a total of $1.6 million.
- In the first seven months of 1998, US/OTP's World Wide Web site received more than 1.5 million "hits" during more than 83,000 user sessions, and users downloaded OTP reports more than 53,000 times. Also in 1998, US/OTP unveiled a new Web site, Go for IT, dedicated to linking businesses, current and prospective IT workers, communities, educators, educational and training institutions, and others.
- US/OTP successfully led the Interagency Committee on Technology Transfer's formulation of a coordinated Administration response to proposed technology transfer legislation. The committee's ability to speak with a single voice contributed substantially to the House Technology Subcommittee's adoption of most of the recommended changes. In addition, the principal industry witness testifying before the subcommittee endorsed the majority of the recommendations of the interagency group, a testament to the group's customer focus.
- OSC was instrumental in shaping the President's commercial remote sensing policy; the President's National Space Transportation Policy; and space launch trade agreements with Russia, China, and currently the Ukraine. OSC's policy work made substantial contributions to the success of the commercial remote sensing and Global Positioning System industries, which are projected to be worth $5 billion to $15 billion by the turn of the century. OSC also worked with the U.S. Trade Representative on space launch trade negotiations to protect U.S. interests in the global marketplace.
- US/OTP evaluates its performance and plans its work through extensive and ongoing consultation with public- and private-sector stakeholders, output tracking, and selected peer reviews. With the exception of the Partnership for a New Generation of Vehicles (PNGV), these measures are direct and verifiable counts of US/OTP staff activities, business processes, and analytical output. Peer review of the PNGV is conducted by the National Research Council, which has well-established procedures for ensuring objective, thorough expert reviews.

PROGRAM DESCRIPTIONS

The FY 2000 request supports the Under Secretary's participation in the Committee on Technology of the President's National Science and Technology Council. This committee, which helps to establish clear national goals for federal science and technology investments and to ensure that federal civilian R&D priorities reflect the requirements of industry customers, is coordinating major Administration R&D initiatives in materials, construction and building, manufacturing infrastructure, and electronics and automotivetechnologies. The FY 2000 budget also supports the international activities of the Under Secretary as the principal U.S. government representative for technology in the U.S.-Japan Economic Framework Talks, the U.S.-Egypt Partnership for Economic Growth, the U.S.-Israel Science and Technology Commission, and the Presidential initiative to support the peaceprocess in Northern Ireland.

In addition, the FY 2000 budget supports the Under Secretary's role as the chair of the high-level committee overseeing the PNGV initiative, a partnership of seven federal agencies, 19 national laboratories, U.S. auto makers, and more than 300 hundred suppliers and universities. US/OTP's base resources support the operations of the PNGV Secretariat, which is responsible for coordination of participating federal agencies, liaison with USCAR (which represents the auto industry in the partnership), and basic record keeping. The PNGV initiative has made strong progress toward achieving its R&D goals, which were established in three areas: advanced manufacturing methods; technologies leading to near-term improvements in automobile efficiency, safety, and emissions; and research leading to vehicle prototypes offering a threefold improvement in fuel efficiency. The four key system areas con-

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sidered most promising have been selected, and R&D efforts now are focused on hybrid-electric vehicle drive systems, irect-injection engines, fuel cells, and lightweight materials.

Among other activities, the FY 2000 budget supports US/OTP's administration of the National Medal of Technology, the nation's highest award for technological achievement that helps increase public understanding of the essential role that technology plays in the global economy. The budget also supports the OSC's continued role in the development of new national space policies and in publishing information on current business trends in commercial space. In addition, it funds the Commerce Science and Technology Fellowship Program, which will place approximately 20 senior government technologists in other agencies to promote understanding of the scope of federal R&D and policy activities.

In FY 2000, US/OTP will manage the Partnerships for a Competitive Economy (PACE) initiative. Working with state and local governments, business, and academia, US/OTP conducts PACE conferences around the country to maintain a dialogue with the private sector on how best to help companies and workers compete and win in the rapidly changing economy of the 21st century. US/OTP also will promote technology-based economic development through the U.S. Innovation Partnership initiative, which seeks to leverage the resources of U.S. industry; academia; and federal, state, and local governments and to create synergy among complementary programs. In addition, through its Meeting the Challenge effort, US/OTP will analyze the competitive status of U.S. firms in several crucial U.S. industries. US/OTP will publish reports on two additional key industries in FY 2000, similar to those previously done on the chemical, steel, automobile, biotechnology, and environmental technologies industries.

PROGRAM CHANGES

The President requests an additional $1 million increase for US/OTP efforts in three key areas. First, US/OTP will expand its analysis and advocacy of current and proposed federal and state economic, technology, and regulatory policies and its research on their impact on innovation and U.S. competitiveness. Second, US/OTP will continue its successful efforts to help the nation meet the rapidly growing demand for IT workers. US/OTP will work closely with industry, state and local governments, and educational institutions at all levels to develop innovative strategies and programs to educate and train American workers for these high-quality, high-wage jobs. Third, the rapid development and deployment of new automotive technologies, together with the expected introduction of new and reformulated fuels, has the potential to revolutionize the global auto industry. In FY 2000, US/OTP will build on existing programs within the Technology Administration to help the automotive suppliers and auto-producing states seize the opportunities that emerge.

FY 2000 will be an evaluation year for EPSCoT. The grant process was initiated in FY 1998 by US/OTP in partnership with state and local governments. By FY 2000, EPSCoT will have conducted two grant competitions, and most of the projects funded under the first competition will be complete or nearing completion. No grants will be made in FY 2000. Instead, a full-scale evaluation effort will assess the management, direction, and effectiveness of the program in meeting its stated objectives, and examine current needs. Therefore the FY 2000 budget proposes a decrease of $1.7 million for EPSCoT.

NIST BUDGET HIGHLIGHTS

SUMMARY

The Administration's fiscal year (FY) 2000 budget request to Congress includes $735 million for the Technology Administration's National Institute of Standards and Technology (NIST), an increase of about 15 percent over its FY 1999 budget of $641 million.

The NIST FY 2000 budget request is divided into three appropriations:

- $290 million for Scientific and Technical Research and Services, including $285 million for the Measurement and Standards Laboratories and $5 million for the Baldrige National Quality Program (BNQP);
- $339 million for extramural programs, including $239 million for the Advanced Technology Program (ATP) and $100 million for the Manufacturing Extension Partnership (MEP); and
- $107 million for construction of the Advanced Measurement Laboratory building and critical maintenance and safety upgrades of NIST's existing buildings.

NIST's four interrelated, merit-based programs—Measurement and Standards Laboratories, ATP, MEP, and BNQP—work together to provide the technical capa-

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bilities that U.S. industry needs to turn scientific and technological advances into commercial products and services in a timely manner. With more and more nations able to produce and distribute world-class technology products and services at competitive prices, the key to continued U.S. economic growth will be faster commercialization of one of the nation's key advantages—the best science and innovation in the world. NIST's challenge is to anticipate and develop the technology, measurements, and standards required to meet industry needs now and in the future. Its programs must keep pace with numerous technology trends, such as the miniaturization and increasing speed of electronics, the rapid growth of electronic commerce and information systems, the emergence of advanced manufacturing systems, and revolutionary advances in life sciences applications.

To meet these needs, the request for FY 2000 will:

- Provide $5.5 million in new funding for three initiatives in the Measurement and Standards Laboratories to help address the nation's science and technology infrastructure needs. In the first, $2 million is requested to fund NIST's participation in a Department of Commerce (DOC) initiative to remove standards barriers to expanded global trade. As part of the Administration's Critical Infrastructure Protection Initiative, $3 million is requested to develop and disseminate the standards, measurements, and test methods needed to protect the information technology elements of critical national infrastructures. Finally, $500,000 is requested to foster professional development of elementary, middle, and secondary mathematics and science teachers.
- Provide an additional $41.2 million so ATP can continue to serve as a significant catalyst in helping U.S. industry turn innovative concepts into practical technologies offering broad-based benefits for the nation's economy. The funding will beused to continue current projects and conduct a competition open to all areas of technology, thereby fostering a sustained industry commitment to high-risk research and promoting greater innovation and experimentation in teaming and alliance formation.
- Provide $1 million in new funding to gather, promote, and effectively deploy to all MEP manufacturing extension centers the highest priority best practices in areas such as employee development and service delivery, both to enhance center quality and effectiveness and to introduce new services quickly to help small and medium-sized businesses compete in global markets. The MEP request is a net decrease of $7 million from the FY 1999 appropriation, due to the natural maturation of existing centers and the resulting decrease in the federal funding share.
- Provide an increase of $55 million for construction of the Advanced Measurement Laboratory as part of the Construction of Research Facilities appropriation. This is a key component of a long and thorough effort to ensure that NIST can keep pace with advances in science and technology and meet the nation's requirements for advanced technical measurements and standards. High-technology industries in Germany, Japan, France, and other industrialized nations already are receiving the competitive benefits of modern facilities from their counterpart NIST organizations.

BACKGROUND AND JUSTIFICATION

NIST promotes U.S. economic growth by working with industry to develop and apply technology, measurements, and standards. This work is increasingly important to the nation for a number of reasons. First, globalization of markets is creating an urgent need to harmonize divergent national systems of measurement, standards, and conformity assessment. Second, rapid technological change, combined with quality and cost pressures, is heightening the need for new standards in emerging industries and ever moreprecise measurements in established sectors. Third, technology development today requires a wide range of scientific and technical competencies, a fact that encourages industry to rely on external sources of measurement and standards technology and expertise. NIST's Measurement and Standards Laboratories lead the way in meeting national needs in these areas.

Fourth, U.S. firms invest heavily in research and development (R&D) but seldom focus on infrastructure or multiuse technologies or projects requiring long-term investments. Furthermore, in nascent technology areas, the cost, technical complexity, and risks of R&D increase the need for collaboration. NIST's ATP helps address these needs by sharing the risks and costs of challenging research and promoting partnerships. Fifth, although small firms are critical links in supply chains and generate large numbers of jobs (over 65 percent of the manufacturing workforce), their productivity often is limited by technical and cost barriers to technology adoption. The MEP helps small and medium-sized companies overcome these barriers. Fi-

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nally, technology has the greatest positive effect on organizations when it is complemented by quality management practices, which enhance performance and productivity. The BNQP recognizes improvement in performance by U.S. firms and disseminates criteria for performance excellence.

NIST PROGRAM PERFORMANCE

NIST uses diverse and complementary sources of performance data to evaluate its products, services, and processes thoroughly. The results consistently show that NIST provides the best, or among the best, technology and services of its type in the world and, moreover, has a powerful positive impact on U.S. firms and the overall economy. The full value of research programs is difficult to evaluate, however, because of the challenges involved in quantifying new knowledge and assessing impacts that often accrue over long time periods across many segments of industry and society.

A comprehensive and rigorous evaluation system for the Measurement and Standards Laboratories is based on a combination of external peer review and internal benchmarking, microeconomic impact studies, and quantitative performance measures. The National Research Council manages panels of industry, academic, and government experts who annually review and critique NIST laboratory programs. In addition, a permanent Visiting Committee on Advanced Technology meets quarterly to review and assess NIST's overall programs and priorities. To ensure that its laboratories perform world-class research that provides technical leadership for the nation*s measurement infrastructure, NIST performs benchmarking assessments of its capabilities relative to other national metrology institutes. Most recent benchmarking efforts show, for example, that NIST is the best in the world in measuring amounts of substances, temperature, humidity, air speed, ultrasonic pressure, and certain ranges of pressure and vacuum.

Quantitative performance measures reflect the laboratories' technology transfer activities and the usefulness of their products and ervices to industry. For example, in FY 1998, NIST calibrated over 3,500 items, providing quality assurance for an even larger private-sector activity that disseminates standards traceable to the national and international measurement systems. In addition, NIST sold almost 37,000 units of Standard Reference Materials—certified "rulers" that companies, government agencies, and others use to check the accuracy of their most exacting measurements. NIST also distributed about 5,000 standard reference database units, which provide evaluated, high-quality data used by scientists and by many industries for applications such as improving the design of industrial processes, the quality of materials, and the performance of advanced information technology systems.

Economic impact studies of NIST's laboratory programs show high rates of return and important benefits to industry. For example, NIST's most recent economic impact assessment focusing on mathematical models and related measurement infrastructure for semiconductor design automation, measured impacts on R&D efficiency, productivity, and product quality that yield a benefit-cost ratio of approximately 23:1 and a social rate of return of about 76 percent. Another recent assessment of NIST work on characterizing the chemical properties of alternative refrigerants estimated a benefit-cost ratio of 4:1 and a social rate of return of 433 percent. The measured benefits included R&D efficiency gains realized by U.S. refrigerant manufacturers and product quality and productivity gains realized by heating and cooling equipment manufacturers. A study of ceramic phase diagrams revealed impacts on R&D efficiency and productivity among ceramic component suppliers, yielding an estimated benefit-cost ratio of 10:1 and a social rate of return of 33 percent.

The ATP has developed a multi-faceted evaluation strategy that includes statistical profiling of projects, real-time monitoring of project developments, microeconomic case studies that detail outcomes over defined periods, and macroeconomic projections of long-term program and project impacts. Approximately 110 new technologies have been commercialized as a result of ATP funding, and evaluation results show that the ATP is successfully improving the capabilities of U.S. businesses to generate economic returns from scientific and technological innovations for the nation.

For example, the status reports on all ATP projects completed as of March 1997 show that technologies developed by 15 of the 38 completed projects have been incorporated into commercially available products or services, and that the economic benefits are expected to be broad in scope and large in magnitude. According to a recent ATP study of more than 200 projects funded from 1993 through 1995, ATP is:

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- generating high-risk, high-impact technologies: 70 percent reported a broader project scope and/or higher level of technical risk than could be supported by industry alone, and 35 percent of the applications represent "new-to-the-world" solutions;
- fostering collaboration: collaboration has helped 78 percent of organizations to achieve project goals (85 percent of those organizations reported that ATP was responsible to a great or moderate extent for the collaboration); and
- accelerating the development and commercialization of advanced technologies: 86 percent of organizations said they would not have undertaken the project without the ATP or were significantly ahead in their R&D cycles as a result of ATP funding.

The MEP pursues extensive evaluation and assessment activities to assure effective management and performance and demonstrate program benefits. An MEP National Advisory Board composed of leaders from industry, state and local governments, academia, and labor has been established to independently assess programs, plans, and policies. In addition, independent reviews are conducted of individual MEP center operations and outcomes using BNQP criteria. These reviews rely on a variety of metrics, including interim impacts on client competitiveness (e.g., increased sales, cost savings, capital investment, and inventory savings) based on regular surveys by the Census Bureau and detailed analysis of the operations and performance of individual centers.

Census surveys indicate that the manufacturing extension centers are fostering significant improvements in manufacturing and business performance. For example, based on a recent sampling of client companies, MEP estimates that in FY 1998 alone MEP services generated approximately $329 million[1] in new sales, $33 million in labor and material savings, and $44 million in inventory savings, while also leveraging $256 million in additional capital investment by client firms.

The BNQP is evaluated by a Board of Overseers, a prestigious group of national quality and business experts. The BNQP also uses a questionnaire and other means to ensure its ongoing responsiveness to the needs of U.S. industry and business. Ultimately, the program can be judged by the performance of companies that follow its lead. A new NIST stock investment study shows, for the fourth year in a row, that quality management can result in impressive returns. When a hypothetical $1,000 was "invested" inthe Standard and Poor's (S&P) 500 and in each of the 18 companies that won the Malcolm Baldrige National Quality Award from 1988 to 1997, the companies' stock outperformed the S&P 500 by about 2.4 to 1.

Since 1988, more than 1.7 million copies of the Baldrige criteria for performance excellence have been distributed. The criteria, which are reviewed annually to ensure continual improvement, have been described as "probably the single most influential document in the modern history of American business." A 1998 survey of chief executive officers found that 79 percent believe the Baldrige criteria and awards are extremely or very valuable in stimulating improvements in quality in U.S. companies, and 67 percent believe the criteria and awards are extremely or very valuable in stimulating improvements in the competitiveness of U.S. business.

PROGRAM DESCRIPTIONS

MEASUREMENT AND STANDARDS LABORATORIES

The NIST laboratories serve as the ultimate U.S. reference point for measurements, working with counterpart organizations throughout the world to provide companies, entire industries, and the science and technology community with the equivalent of a common language needed at nearly every stage of a technical activity. The labs also further the technical aims and capabilities of U.S. industry and serve as impartial sources of expertise, developing highly leveraged measurement capabilities and other infrastructure technologies.

NIST laboratories perform a multitude of essential functions. For example, NIST's electrical measurements help advance the growing $350 billion electronics sector, providing the microwave antenna measurements used by every major U.S. aerospace company and the national reference standards that support the accuracy of the electric power meters in every U.S. home and business. NIST provides the measurement capabilities underlying voluntary standards for the manufacture of U.S.-made optical fiber communications lines, supporting an industry that competes in a $10 billion world market.

NIST also develops and disseminates national standards for time and frequency to meet critical needs in telecommunications, transportation, and positioning (in-

[1] Data updated January 1999.

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cluding support for the Global Positioning System). The laboratories provide chemical, biochemical, and chemical engineering measurements; standards; data; calibrations; and predictive methods and models to support industries and programs ranging from chemical processing to environmental monitoring to biotechnology and health care to semiconductor manufacturing. As the global market demands ever higher quality, U.S. industries depend on NIST for calibration services that ensure dimensional compatibility of items manufactured at different sites and satisfy requirements for traceability to national standards.

In addition, NIST provides national standards for the 11,000 U.S. mammography facilities and for exposure quality in the $10 billion U.S. photographics and X-ray film industry. The NIST Center for Neutron Research, a world-class facility where unique instruments reveal the inner structure and dynamics of virtually any material, is used annually by about 1,300 researchers from more than 50 U.S. companies, 90 universities, and 30 other government agencies. NIST operates the foremost U.S. fire research laboratory and is the principal R&D agency working to reduce earthquake hazards through improved building codes and standards and practices for structures and lifelines. NIST also supports the U.S. information technology sector, which adds $680 billion to the gross domestic product annually, by developing test methods, computer science and engineering methods that underpin metrology, and open testbeds for industrial collaboration. NIST supports economic growth through the Internet by developing test methods and security services for infrastructure, encryption, and data sharing.

In addition to its internal research, in FY 1998, NIST worked on about 325 Cooperative Research and Development Agreements (CRADAs) involving collaborative R&D of mutual interest with for-profit organizations, non-profit organizations (including universities), public and private foundations, state and local governments, and individuals. Since 1988, NIST has signed more than 830 CRADAs.

The FY 2000 appropriation for the Measurement and Standards Laboratories will support further development of critical measurement technologies and methods, calibration services, national standards, and reference data needed by the United States to promote technological progress, improve product and service quality and reliability, and enhance international competitiveness. For example, the NIST laboratories plan to:

- support the semiconductor industry by developing methods for measuring the flatness and thickness of wafers 300 millimeters in diameter (the new industry standard) with uncertainties of 2 nanometers, developing technology for calibrating equipment that can detect water vapor in inert processing gases at levels about 500 times lower than can be achieved now, and developing laser power and energy measurements to calibrate lasers used to fabricate devices with critical dimensions of 180 nanometers and below;
- develop dosimetry and radioactivity standards for new radioactive sources for use in prostate cancer therapy and in preventing blood vessels opened by balloon angioplasty from reclosing;
- support business use of electronic commerce by developing and disseminating a software translator that will convert a company's internal dictionary of product terminology into the industry-standard format, thus enabling engineers and designers to compare products and check their compatibility;
- help create fair and free access to world markets for U.S. manufacturers by participating in international comparisons of the mechanical quantities associated with mass, force, vibration, and acoustics, and by refining and extending SIMnet, a pilot, Internet-based system that enables real-time measurement comparisons and collaborations among national metrology labs in different regions of the world;
- assist manufacturers by increasing the speed and reducing the cost of inspections of manufactured parts through the implementation of new technologies on multimodal measuring devices and development of open-architecture interface standards for these machines; and by establishing an intelligent automated welding testbed to improve weld quality and developing interface standards that will enable industry to use this technology effectively;
- establish new measurement capabilities to support new or advanced technology development and dissemination in the chemical, materials processing, and manufacturing industries as well as new high-technology industries;
- support trends in the electronics and computer industries toward improved efficiency in storing, retrieving, and processing information by commissioning a nanoscale physics facility for characterizing electric, magnetic, and structural properties of quantum electronic devices;

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- assist the U.S. auto industry in the cost-effective use of lightweight materials through measurement, modeling, and standards activities, including the development of methods to measure the performance of reinforcing fillers for polymeric materials;
- assist the U.S. microelectronics industry in designing a new generation of higher speed devices quickly and economically by developing experimental and computational techniques to measure the properties of polymeric and ceramic thin-film materials and metallic electrical interconnects;
- advance the U.S. construction industry by completing experimental and finite modeling to establish baseline structural performance characteristics of residential housing composed of traditional and non-traditional construction materials; developing a method based on a flow simulation model for optimizing high-performance concrete mixtures; and completing the virtual Cybernetic Building Testbed for building shells, heating and cooling systems, and fire detection systems; and
- help keep the United States at the cutting edge of information technologies by adopting an advanced encryption standard that will provide significantly improved security; providing conformity assessment methods to ensure consistency with and accurate use of the Java specification; and developing and disseminating Standard Reference Data and guidelines for emerging biometric authentication techniques, including facial data, to support the needs of law enforcement and security access designers.

INITIATIVE: EXPORT PROMOTION

One-third of the growth of the U.S. economy depends on exports. In 1997, total U.S. exports amounted to $960 billion, supporting one in five U.S. manufacturing jobs and accounting for 2 million new jobs in the past four years. And yet, while world trade has been increasing by 15 percent annually, total U.S. experts have risen only 9 percent, and exports to the European Union are growing at less than 5 percent annually. This problem can be attributed in part to local or regional technical standards that serve as barriers to U.S. exports.

The FY 2000 $2 million initiative will support a strategy to remove or avert technical barriers to trade by increasing worldwide recognition of U.S. measurements and standards and streamlining the domestic standards development process.

Comparisons of U.S. national measurement standards with those of other nations are essential to ensure that American products are not rejected simply because of disagreements over the methods used to perform a measurement or test. As new technologies emerge and national economies grow, the number and frequency of such comparisons are rising. NIST will expand related activities in physical, electrical, and radiometric measurements and improve or develop new capabilities in emerging and high-technology areas such as information technology and biotechnology. In addition, to meet rapidly increasing demand for chemical measurement standards, NIST will expand its portfolio of Standard Reference Materials and seek agreements with trading partners assuring mutual recognition of each partner's standards. Target areas will include important U.S. export sectors such as automobiles, fuels, pharmaceuticals, medical diagnostics, and food.

NIST also will develop capabilities to help U.S. industry meet the European Union's new requirements that products generate no harmful emissions and be immune to electromagnetic disturbances. Further, NIST will resolve and unify U.S. and international standards efforts for coordinate measuring machines, which are becoming common in automotive, aerospace, heavy equipment, and machine industries. These machines provide highly accurate dimensional measurements of mechanical parts with complex shapes.

Finally, NIST will help to increase U.S. participation in international standards development by providing $1 million to the American National Standards Institute (ANSI). ANSI is the official U.S. representative to the International Organization for Standardization and the International Electrotechnical Commission. An expanded infrastructure of technical measurements and standards coupled with ANSI's strong leadership and participation in the international standards arena will support the growth of U.S. exports by reducing or eliminating technical barriers to trade.

INITIATIVE: CRITICAL INFRASTRUCTURE PROTECTION

The United States has both the world's strongest military and largest national economy, each of which is increasingly reliant on information technology. Attacks on, or failures of, U.S. information systems could damage and undermine the nation's entire economy. M e: omputer and communications systems are vul-

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nerable, and, if protection is added, it typically is expensive and of questionable effectiveness. Cost-effective technology, measurements, and test methods are needed to help avert catastrophic failures of critical infrastructures due to terrorism, war, or human error and to reduce the fraud, waste, and abuse perpetrated through low-level attacks on the computer and communications infrastructure.

Presidential Decision Directive #63 calls for a national effort to improve the security of critical infrastructures, and the President's FY 2000 budget has made critical infrastructure protection a major priority. DOC is designated as lead agency for the information and communications sector. NIST also has a legislated mandate for computer security. Accordingly, NIST will develop measurements, test methods, and standards needed to help ensure the reliability, trustworthiness, and survivability of information technology systems supporting critical national infrastructures.

The $3 million initiative will focus on efforts in security technology, system survivability, high-confidence systems, security for supervisory systems, and security for federal systems. In the security technology area, NIST will collaborate with industry to accelerate the convergence of standards for public key infrastructure (which includes the mechanisms, procedures, and policies for the deployment of public key cryptography) and the deployment of related products and components. NIST also will develop metrics and test methods and establish testbeds to enable comparisons of products that promote system survivability. NIST will support the development of ultra-dependable computing technology, which is needed, for example, to make it possible for increased numbers of aircraft to share the skies safely. NIST will develop new methods of assurance and new techniques for combining dependable components into integrated systems.

Supervisory systems are used to control processing in major industrial applications. NIST will develop measurement techniques to apply advanced security to two specific types of supervisory systems. The work then will be applied to all supervisory systems.

In addition, NIST will work with other government agencies and the private sector to identify resources and cost-effective strategies for information and help federal agencies implement information assurance best practices.

INITIATIVE: TEACHER SCIENCE AND TECHNOLOGY ENHANCEMENT PROGRAM

In the 21st century, science and technology will play increasingly important roles in U.S. economic competitiveness. In all realms of business, productivity gains and market leadership will require technical insight and scientific creativity. However, trends in education threaten to undermine the nation's economic future. Recent international studies of science and math performance show U.S. high school students ranking near the bottom of industrialized nations, and fewer U.S. students are choosing careers in science and technology. Growth in several technical sectors of the U.S. economy already is limited by lack of technically skilled workers, and the problem is expected to worsen in the next decade.

The nation needs to substantially improve science, math, and technical education for all its citizens to maintain economic growth and competitiveness. This challenge is large and complex, but one way of improving science and math education is to enhance the training and development of science and math teachers.

The proposed FY 2000 $500,000 initiative will permit NIST to leverage a modest federal investment for the greatest benefit to science and math teachers nationwide. NIST will develop several ways to enhance teacher development. Approaches include on-site training programs; community-based training programs leveraging NIST contacts with industry; Internet-based, on-demand references and services for teachers that utilize and extend NIST's expertise in forefront Internet capabilities; and other activities that are determined to add real value to professional enhancement of U.S. science and math teachers.

Because the proposed funding is modest relative to the scope of the challenge, NIST will actively seek collaborations with other federal agencies, national education organizations, and the private sector for greatest leverage of federal funds.

BALDRIGE NATIONAL QUALITY PROGRAM

The BNQP has become a focal point for strengthening America's competitive position. The program helps many types of companies and organizations deliver ever improving value to customers while improving overall organizational effectiveness. It creates a performance excellence standard that fosters communications and sharing in the private sector, building networks to deliver performance and quality management information and services and to share lessons learned with other economic sectors.

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Applicants for the Baldrige Award gain valuable insights by receiving 300 to 1,000 hours of review by at least six experts on the board of examiners, who provide a detailed feedback report on the organization's strengths and opportunities for improvement. Since 1988, 34 companies have received the Baldrige award, which is given in manufacturing, service, small business, and, starting in 1999, education and health care. Thousands of other organizations use the Baldrige criteria internally to assess and improve their performance.

The BNQP has proven to be highly effective in stimulating interest in performance improvement, excellence, sharing and cooperation, and the creation of new information networks within the business and public sectors. Collectively, Baldrige Award recipients, examiners, and NIST staff have given more than 50,000 presentations at conferences worldwide. With a relatively small annual federal investment, the Baldrige program leverages over $100 million in-kind contributions from the private sector and state and local governments.

The FY 2000 appropriations of just over $5 million will be used to manage the annual award competition, conduct a conference at which Baldrige award winners share their performance excellence strategies, maintain a comprehensive database on state and local quality awards, continually improve the performance excellence criteria that serve as the national standard, and facilitate information sharing among all sectors of the U.S. economy.

ADVANCED TECHNOLOGY PROGRAM

The ATP shares the cost with industry of developing novel, cutting-edge technologies for a broad range of civilian applications that will promote U.S. economic growth. It fosters partnerships among companies of all sizes, universities, and research centers to help bridge the gap between basic research and product development and create an environment conducive to overcoming daunting technical barriers and addressing long-range R&D opportunities. The program assumes some of the risk of early-stage technology development, enabling industry to pursue promising technologies that otherwise would be ignored or developed too slowly to compete in rapidly changing world markets. The ATP supports R&D to the point where it is feasible for companies to begin product development using private funds. The program does not fund commercialization.

The ATP conducted 39 competitions from 1991 to 1998. Through 1998, the ATP had selected 431 projects for funding, including 146 joint ventures. More than 1,000 participants, including more than 100 different colleges and universities, have been involved. About 55 percent of all ATP projects are led by small businesses. Two-thirds of awards made to single companies have gone to small firms. The awarded projects involve a commitment of over $1.39 billion in NIST funds and $1.40 billion in private-sector funds over their lifetimes. By creating opportunities for new, world-class products, services, and processes, the ATP benefits not only individual project participants but also other companies and industries and, ultimately, consumers and taxpayers.

The awards are made on the basis of a rigorous competitive process that considers the scientific and technical merit of each proposal and its potential benefits to the U.S. economy. Each year, the ATP conducts a general competition open to proposals involving any area of technology. To have a greater impact in important technology areas identified with extensive industry input, the ATP began holding focused program competitions in FY 1994. In FY 1999, the ATP is using a new competition structure that combines the best features of both the general and focused competitions. The competition is open to all areas of technology, but proposals will be evaluated and ranked in competition with others in the same technology area. Five review boards are planned in biotechnology, electronics, information technology, manufacturing, and chemistry/materials.

The proposed FY 2000 appropriation of $239 million will enable the ATP to continue multiyear projects selected in previous years; conduct a new competition open to all areas of technology; and continue to implement a multifaceted economic evaluation program that includes statistical profiling, microeconomic case studies, and macroeconomic projections of long-term project and program impacts. The request, when combined with anticipated carryover and prior year recoveries, will permit approximately $73 millionfor new awards.

Because small firms already lead 55 percent and participate in 70 percent of all ATP projects, the Administration is proposing, through the appropriation process, that ATP be exempt from the Small Business Innovation Research program set-aside in FY 2000.

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MANUFACTURING EXTENSION PARTNERSHIP

The MEP provides small and medium-sized manufacturers with access to technologies, resources, and expertise through the cost-shared, cooperative efforts of NIST, state and local governments, and local extension service providers. The partnership is a nationwide network of regional manufacturing extension centers, which are linked to diverse federal, state, university, and private sources of technology and expertise. Each center uses the network to provide cost-effective services to client firms in areas such as best manufacturing and business practices, workforce development and training, access to financing, and environmental services.

The MEP has succeeded in its initial goal of placing critically needed extension services within reach of small and medium-sized manufacturers in all 50 states, the District of Columbia, and Puerto Rico. More than 2,000 manufacturing specialists and professional staff now provide services through more than 400 MEP-affiliated centers and offices. Approximately 26,000 enterprises were served in FY 1998.

To optimize center performance and further increase the competitiveness of smaller manufacturers, two efforts were initiated recently. First, the BNQP evaluation criteria have been adopted as a framework for generating continuous improvement in MEP-funded center performance and impact. Second, an integrated knowledge management system is being developed to facilitate the sharing of best business practices among the centers.

In addition, MEP is training field staff from the Department of Agriculture, the Small Business Administration, and others so they will be able to conduct in-depth seminars on year 2000 issues for their constituents across the country.

The proposed FY 2000 appropriation of $100 million will enable the MEP to reach additional manufacturers, conduct reviews and manage the nationwide network of extension centers, collect and evaluate data on center performance and impact on client firms, and further develop electronic networking and information capabilities. The request includes $1 million in new funding to gather, promote, and effectively deploy to all MEP manufacturing extension centers the highest priority best practices. Currently, MEP is able to provide only very limited best practice information to centers. Funding under this initiative will enable MEP to accelerate its efforts to meet center demands for best practices information in the areas of center operations, center business practices, and service delivery.

The FY 2000 budget request also proposes a decrease of $9.1 million in MEP funding. This decrease reflects a lower federal share of the centers' operating costs since the federal share changes as the centers mature. In the first three years, the federal share is 50 percent; in year four, 40 percent. In years five and six and for renewals, the federal share is one-third. The number of centers will not change as a result.

NIST FACILITIES

NIST maintains about 50 specialized laboratory, office, and support buildings on two campuses in Gaithersburg, Md., and Boulder, Colo. The great majority of those buildings are 30 to 45 years old and are deteriorating at an accelerating rate. NIST has designed a master facilities plan to guide the replacement, renovation, or repair of these buildings so that NIST can continue to provide U.S. industry and science with the best possible measurement system.

The requested FY 2000 appropriation includes $95 million to be combined with $108.3 million already appropriated in FY 1998 and FY 1999 for construction of the Advanced Measurement Laboratory (AML). The AML will allow NIST to provide U.S. industry and science with higher quality NIST reference materials, improved measurements, and faster access to NIST research advances. The AML will provide stringent controls on particulate matter, temperature, vibration, and humidity that are unattainable in current NIST buildings. These new NIST laboratory facilities will be equal to, or better than, similar laboratories overseas. Such conditions are vital for housing the institute's most advanced metrology, physics, chemistry, electronics, engineering, and materials science research and will enable NIST to keep pace with rapid developments in semiconductors, industrial robots, computers, pharmaceuticals, and emerging technologies requiring molecular and atomic-level precision. The AML will be a shared resource for NIST and the industrial and scientific communities that work closely with NIST.

NIST also is requesting $12 million to undertake the highest priority safety, capacity, maintenance, and major repairs to ensure compliance with various federal, state, and local health and safety regulations, to make modifications needed to improve access for people with disabilities, and to keep the existing buildings in reliable working order. This represents a one-time decrease of $5 million to partially offset the cost of the AML construction.

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NTIS BUDGET HIGHLIGHTS

SUMMARY AND JUSTIFICATION

The National Technical Information Service (NTIS) was established in the aftermath of World War II to make available to industry much of the formerly classified research performed throughout the country in support of the war effort as well as captured enemy research. In 1950, the Secretary of Commerce was given the statutory mission to collect and organize scientific, technical, and engineering information "from whatever sources, foreign or domestic, that may be available" and to "make it more readily available to industry and business, and to the general public." Over the course of its 50-year history, NTIS has amassed a collection of more than 3 million items, including the most comprehensive collection of federal research results.

Consistent with its mission, NTIS seeks out, organizes, stores for all time, and makes accessible virtually all federally financed scientific, technical, and engineering reports and complementary material from foreign and other sources. Unlike a commercial enterprise, which would preserve only that material having a significant, immediate commercial value, NTIS preserves material based on its potential use to U.S. industry and business. This ensures public availability to an accessible, convenient central source of information from a variety of sources, as well as a permanent record of the government's massive investment in research and development since the end of World War II.

For many years, NTIS has covered costs through fees for its products and services. However, changes in the information industry have resulted in declining revenues. Because the organization and preservation of this knowledge will benefit generations of future researchers as well as current customers, the proposed FY 2000 budget includes a request for $2 million to partially fund NTIS' activities to organize and preserve the 70,000 technical information items it adds to its permanent clearinghouse each year. The remainder of these $6 million activities, as well as all of NTIS' other costs, will continue to be supported through fees for products and services.

The funding will help to ensure that NTIS will continue to function as a true clearinghouse and, as such, preserve information for future researchers.

[The prepared statement of Mr. Bachula follows:]

PREPARED STATEMENT OF GARY BACHULA, ACTING UNDER SECRETARY, TECHOLOGY ADMINISTRATION, DEPARTMENT OF COMMERCE

INTRODUCTION

Thank you Mr. Chairman and members of the subcommittee. I appreciate the opportunity to meet with you today to discuss the Technology Administration's FY 2000 budget request. As the President noted in his October 30, 1998 signing statement that accompanied the Technology Administration Act of 1998, we are looking forward to working with the Congress on authorization legislation for the Technology Administration and its component agencies.

The Technology Administration includes the Office of the Under Secretary for Technology, the (NIST), the (NTIS), the Office of Technology Policy (OTP), and the Office of Space Commercialization. As you can see by the make-up of our organization, the Technology Administration is concerned fundamentally with the health of civilian technology in the United States.

My testimony today will focus on the global competitive environment, and address the initiatives of the Technology Administration, focusing primarily on the role of the Office of the Under Secretary and the Office of Technology Policy (US/OTP) in the context of today's global economy. I will also address the NTIS budget request in the context of the changing environment in which it operates. I will be followed by NIST Director Ray Kammer who will discuss NIST's budget request.

U.S. ECONOMIC PERFORMANCE EXTRAORDINARY

The performance of the U.S. economy continues to astound the experts. We now have the longest peacetime economic expansion in history and the lowest peacetime unemployment since 1957. We have the lowest inflation rate since 1959, the lowest welfare rolls in 29 years, and we have balanced the Federal budget for the first time in 20 years. We have created 18.2 million new jobs in the last 6 years—the majority of them paying above average wages—and wages overall are rising at twice the rate of inflation. Last year's overall growth rate of 3.9 percent exceeded expectations and t[illegible]uarter (annualized) rate of 6 percent was sizzling.

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Some people call it the miracle economy, but it is no miracle at all. Our economy is strong because we have focused on the things that contribute most to economic growth and job creation. We are rapidly building an infrastructure for a knowledge-based economy. We are increasing our investments in human capital. The United States is one of the very best places in the world to conduct commerce, with a climate that fosters innovation and business competitiveness.

Perhaps most important, we have significantly increased our national investment in research and development. Between 1994 and 1997, total U.S. R&D expenditures climbed by more than 13 percent in real terms, while industry increased its real investment in R&D by nearly 25 percent.

TECHNOLOGY DRIVING ECONOMIC GROWTH, JOB CREATION, PRODUCTIVITY IMPROVEMENTS

More than ever before, technological leadership is vital to the national interest of the United States. Our ability to harness the power and promise of leading-edge advances in technology will determine, in large measure, our national prosperity, security and global influence. Technology underpins our fastest growing industries and high-wage jobs, and provides the tools needed to compete in every business today.

Leading economists now identify technical progress as a major, if not the single most important, factor in sustained economic growth, accounting for as much as one half of U.S. economic growth in the past 50 years. Technology is expected to continue to fuel our growth.

In recent testimony before Congress, Federal Reserve Chairman Alan Greenspan noted, "The current economic performance, with its combination of strong growth and low inflation, is as impressive as any I have witnessed in my nearly half century of daily observation of the American economy." He then attributed much of the economy's success to productivity improvements resulting from technological advance: "Signs of a major technological transformation of the economy are all around us, and the benefits are evident not only in high-tech industries but also in production processes that have long been part of our industrial economy." In particular, Chairman Greenspan pointed to the accelerating expansion of computer and telecommunications technologies as a force that should appreciably raise our standard of living in the 21st century.

NO TIME TO REST

But we must not allow our success to lull us into a false sense of economic security. The world is changing rapidly and global markets demand constant innovation and improvement. In the New Economy, benefits will accrue to companies and countries that continue to invest, innovate and compete; unrelenting market forces will not be kind to those that do not.

Not long ago, the emergence of powerful new competitors and resurgence of others raised great concerns about America's position of global economic leadership. So we did what Americans have done throughout our Nation's history—we redoubled our efforts, made the tough choices, and got down to the business of competing. As a result, today we are out in front of the global pack and the American people are reaping the benefits of our reinvigorated competitiveness.

We must not let up. Often this competition has been compared to a race—with winners and losers determined at the finish line. In such a race, winners rest after the victory. But in this global competition, there is no finish line—winners and losers are determined along a course without end—and there is no rest for the winners. To maintain our economic leadership—and the prosperity it brings—we must maintain our vigilance, prepare for the challenges of the 21st century, and invest in our future.

U.S. INVESTMENTS IN SCIENCE, TECHNOLOGY & INNOVATION CONTINUE TO PAY LARGE DIVIDENDS

Federal research has given birth to new industries, such as computers and biotechnology, and propelled U.S. firms into leadership positions in other industries, including aerospace, telecommunications, and pharmaceuticals.

These contributions were made possible, in large measure, by the dominance of U.S. government R&D expenditures as a share of global R&D investment. In the period following World War II, the United States accounted for more than 70 percent of total global R&D expenditures, with Federal R&D spending accounting for most of the U.S. investment. The relative size of the Federal investment meant that the U.S. government could drive technology development through its investments to meet national needs—primarily in defense, then later in space and in health. In ef-

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fect, U.S. science and technology policy was defined by where the Federal government spent its R&D dollars.

DECLINING SHARE OF GLOBAL R&D INCREASES IMPORTANCE OF FEDERAL POLICY FOR PROMOTING U.S. COMPETITIVENESS

Federal research continues to yield important advances in nearly every field of science and technology, delivering substantial benefits to the economy. However, the role of the Federal government as the dominant driver of global technological innovation has waned in proportion to its relative share of global R&D. Today, the United States accounts for less than a third of total global R&D spending. The U.S. private sector accounts for nearly two-thirds of the total U.S. investment, and the Federal government accounts for only about 30 percent. Even more striking, Federal civilian R&D spending—$39.8 billion in the President' FY 2000 budget—accounts for less than one-fifth of total U.S. R&D.

Even in this environment, the Federal government still plays a critical role in the U.S. R&D enterprise, including advancing promising new emerging and enabling technologies—in partnership with U.S. industry—that offer substantial economic and social returns to the Nation. This, in fact, is the very role of the Advanced Technology Program that Director Kammer will address in detail today. In addition, the President's budget includes increased investments in critical civilian science and technologies areas, including health, high performance computing, environment, agriculture, space, energy, and education, as well as multidisciphnary, multi-agency efforts such as the Partnership for a New Generation of Vehicles which I will address in more detail later in my remarks.

It is important to note, however, that with the Federal government's decreasing share of both U.S. and global R&D spending, technology policy is an increasingly important tool in the Federal government's ability to promote U.S. competitiveness and economic growth through research and development, and it is the raison d'etre of the Technology Administration's Office of the Under Secretary/Office of Technology Policy (US/OTP).

US/OTP is charged by Congress under the Stevenson-Wydler Act with developing and advocating Federal policies that maximize technology's contribution to national economic growth, U.S. industrial competitiveness, the creation of high wage jobs, and a higher standard of living and quality of life for all Americans—a mandate that mirrors this committee's responsibilities.

US/OTP: ADVOCATE FOR THE U.S. INNOVATION ENTERPRISE

In the broadest sense, US/OTP serves as the advocate for the U.S. innovation enterprise. We serve as a focal point for key issues that matter to industry's ability to keep our enterprise healthy and vibrant. A hallmark of US/OTP's efforts in this regard is our "Listening to Industry" approach. By maintaining a dialogue with industry and other key players in the U.S. innovation system, US/OTP is able to effectively serve as a forceful advocate for improvements in the Nation's business climate for innovation. To this end, US/OTP conducts research and analysis, convenes key parties, spotlights critical issues, stimulates debate, identifies solutions, and advocates for improvements in U.S. policy, laws, and regulations. During FY 2000 we will concentrate on several initiatives to fulfill our mission:

- Lately we've devoted much effort to helping the Nation meet the growing demand for skilled information technology workers. Over the past year, we have conducted town meetings across the Nation, and participated in a wide range of fora seeking to address this challenge. US/OTP's analytical and advocacy work on this issue has catalyzed public and private efforts to address the challenges, including unprecedented cooperation among the Commerce, Labor, and Education Departments. Our IT web site, launched in August of 1998, received more than 660,000 hits in its first four and one-half months. Through the site, which lists more than 180 reference sources of various types, visitors can learn about high-tech work force initiatives and network with other people who can offer insight and opportunities for collaboration. US/OTP will be producing our third report on this issue later this year reflecting what we have heard at our town meetings, identifying best practices, and examining Federal policy responses to the challenge which we will address in FY 2000. We believe there are several pressure points in information technology work force development where government leadership could make a difference. In FY 2000, we will focus our efforts on areas such as: collecting and disseminating information on innovative IT training and work force development solutions, including further development of our popular "Go for IT" web site; skills mapping efforts to identify worker pools that are good candidates for IT jobs and how to move them

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rapidly into these careers; encouraging expanded use of telecommuting and teletraining; and encouraging young Americans to pursue technical careers.

• The research and analysis we have conducted under our *Meeting the Challenge: U.S. Industry Faces the 21st Century* series of industry competitiveness assessments has created a substantial base of knowledge and expertise from which US/OTP, other Executive Branch agencies, and Congress can call upon in the development of public policies designed to stimulate U.S. competitiveness. To date, US/OTP has produced reports on the competitive status of a wide range of key American industries—chemicals, biotechnology, automobile manufacturing, steel, and environmental—to the critical acclaim of industry leaders and government policymakers.

Two new benchmarking studies, due to be completed this year, will identify key areas for policy analysis and development in FY 2000. These new studies are especially important, since they deal with emerging industries where information needed for business and government decision making is often inadequate. Areas of attention include:

• space commerce, where the Commerce Department has committed to a leadership role in encouraging the development of this promising emerging industry; and
• electronic commerce, where a wide range of business and consumer issues are emerging with implications for government policy.
• U.S. industry has long encouraged US/OTP to play a stronger role in assessing the effect of economic, regulatory, trade, and other policies on the U.S. business climate for innovation, and in identifying policy barriers to technology development and commercialization. In the past several years, industry has identified policies such as securities litigation, product liability reform, and antitrust as areas in need of examination for their effect on innovation. In FY 2000, US/OTP would focus on business climate issues such as: educating Federal government leaders who do not work in technology policy on how policies in their areas of responsibility affect innovation, and working with the private sector to analyze issues affecting the availability of capital for technology development and commercialization, including the extent to which a technology funding gap occurs between early stage capital and product development which may significantly inhibit the innovation process. We are also exploring ways to improve the public's understanding of the vital role technology plays in the U.S. economy.
• US/OTP's focus on competitiveness made the agency the logical choice to serve as government secretariat for the Partnership for a New Generation of Vehicles initiative. The global competition to produce highly fuel efficient vehicles has gone into overdrive, with companies around the world announcing new technological advancements toward this goal on a regular basis. With this in mind, US/OTP expects FY 2000 to be a banner year for PNGV. In 2000, each of the participating auto companies will unveil their PNGV concept demonstration vehicle, and will be well on the way to producing production prototypes in 2004 as envisioned.

The rapid development and deployment of new automotive technologies, together with the expected introduction of new and reformulated fuels, has the potential to revolutionize the global auto industry, with significant repercussions for America's car companies and the automotive supplier base. In large measure, neither the supplier base nor the states are aware of the magnitude of the technology changes coming in the auto industry and the profound impact these changes will have upon their economic success. In FY 2000, US/OTP will build on existing programs within the Technology Administration to help the automotive supplier base—and states whose economies are linked closely to the automotive sector—prepare for these changes and to seize the opportunities that will emerge.

• One of the mechanisms that US/OTP will rely on to this end is our U.S. Innovation Partnership (USIP) initiative, whose purpose is to build stronger relationships between Federal and state efforts to promote technology-based economic development. USIP seeks to leverage the resources of U.S. industry; academia; and Federal, state, and local governments and to create synergy among complementary programs.

This past year, USIP successfully elevated the profile of technology's role in state and local economic development among the Nation's governors and state legislators. For the first time, technology was the central theme at the National Governors Association's annual conference, and the role of technology was highlighted at the National Conference of State Legislatures annual meeting. At the NGA meeting, in ad-

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dition to plenary sessions focused on technology, the Committee on Economic Development and Commerce featured a report on USIP by the Lead Governors on Technology. Further, the conference included a unique State Leadership in Technology Exposition including displays of state best practices in using technology to improve the lives of all Americans.

In partnership with the Science and Technology Council of the States, USIP also convened two Washington, DC roundtables. The first roundtable stimulated a productive dialogue among former state science and technology directors and Federal S&T agency heads and program directors on new frontiers for partnership activities. At second roundtable, state science and technology directors, economic development directors and elected officials highlighted their states' S&T activities, exchanged ideas and information, and discussed best practices.

On the policy front, USIP efforts have also yielded recommendations from both Federal and state perspectives for improving program operations of the Small Business Innovation Research (SBIR) program, including input to the upcoming SBIR reauthorization. While the consensus building process is still in progress regarding the specifics of these joint recommendations, it is clear that the states have a strong interest in the SBIR program and are joining their Federal counterparts in determining their appropriate respective roles in the full span of program activities—from initial awareness to commercialization.

- FY 2000 will be an evaluation year for US/OTP's Experimental Program to Stimulate Competitive Technology (EPSCoT) initiative, which is designed to foster development of indigenous technology assets in states and regions traditionally under represented in Federal R&D funding in order to foster technology-based regional economic growth. By FY 2000, EPSCoT will have conducted two grant competitions and most of the projects funded under the first grant competition will be complete or nearing completion. In FY 2000 we will conduct a full-scale program evaluation—assessing the management, direction, and effectiveness of the program in meeting its stated objectives, as well as conducting a current needs assessment.
- US/OTP is continuing its leadership role in analyzing and strengthening Federal agency efforts to meet the goals of the Federal technology transfer legislation of the 1980s. Charged with producing biennial reports to the Congress on this subject, US/OTP's 1999 report will help guide our FY 2000 activities in this area. In addition to the report, we will convene a series of roundtables with industry representatives to gain a better understanding of their experiences in working with Federal labs. The report and these roundtables will lay the groundwork for recommendations on improving agency work practices and, if needed, new legislative initiatives.
- Also in fulfilling our leadership role in the area of technology transfer, and in partnership with the National Science and Technology Council's Committee on National Security, we are examining the adequacy of procedures when Federal labs enter into international cooperative research and development agreements. We are analyzing the implications such cooperation may have on effective protection of intellectual property rights, as well as on U.S. national security and global competitiveness.
- Our research and analytical capabilities extend to the international front as well. US/OTP monitors and reports on the science and technology plans, programs and policies of other nations; represents U.S. industry's interests in international science and technology fora, such as the OECD and APEC; and provides advice and counsel to other Federal agencies whose negotiations with other nations on science and technology issues could affect the competitiveness of U.S. industries.

Several analyses to be published this year are expected to identify issues that will require government's attention in FY 2000, as well as identifying opportunities and challenges for U.S. businesses in the global marketplace. Areas of analysis include:

- the role of information technology in the development strategies of Asian nations, where business competitiveness issues are a key focus;
- science, technology, and innovation in the People's Republic of China, an important examination of policies in a country expected to be a major force in the 21st century global economy; and
- the globalization of R&D, which is part of our continuing efforts to understand the implications of the global flow of technology and R&D investment.

In FY 2000, we will continue to focus attention on understanding Asia's growing role in R&D and technology, and exploring the burgeoning technology capabilities in Latin America.

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Our budget request for FY 2000 is explained in the Budget Highlights which has been submitted to the Committee.

NTIS: APPROPRIATION NEEDED TO SUPPORT STATUTORY FUNCTION

As the Committee has no doubt noted, the President's FY 2000 budget includes a request for $2 million for the National Technical Information Service.

Over the past half-century, NTIS has amassed a collection that consists of more than three million individual scientific, technical, and engineering titles. Including a title in the NTIS collection entails costs associated with acquiring a product; abstracting, cataloging, and indexing the title so that it can be identified; merging it into NTIS' permanent bibliographic database; and physically storing it or scanning it into an electronic image for electronic storage.

The appropriation request for NTIS is necessary to partially cover costs associated with these functions. The organization of technical knowledge in easily retrievable form benefits NTIS' current customers, and ensures the permanent preservation of the taxpayers' $70 billion annual investment in research and development for future generations of researchers and the public at large.

NTIS cannot afford to subsidize the entire cost associated with the collection, organization and preservation of technical information through its projected 2000 sales. Losses have been incurred in the Clearinghouse where the organization and preservation functions reside. These losses have eroded NTIS' retained earnings to the point where further losses will place the agency on the verge of deficiency. The cost associated with order processing, duplicating and disseminating information products to customers will continue to be funded through sales.

NTIS has taken strong measures to increase revenue and reduce costs. It has undergone a reduction-in-force and now has 321 employees, down from 390 at the beginning of FY 1997. It has made significant investments to modernize its facilities and increase productivity. However, fixed costs remain relatively constant.

The appropriation request will help to ensure NTIS remains financially viable through FY 2000. We look forward to working with this Committee to resolve all issues concerning the future of NTIS.

CONCLUSION

In summary, Americans and American business are doing well—and we are doing well, in large measure, as a result of our national investments in science and technology, and the innovation and competitiveness they yield. In this perpetual marathon that is global competition, now is the time to strengthen our national efforts. We must prepare ourselves to seize new opportunities and create fertile ground for economic growth—with a healthy business climate, a modern infrastructure, a world class work force, and a strong base in science and technology. Thank you.

Senator FRIST. Mr. Kammer.

STATEMENT OF RAYMOND G. KAMMER, DIRECTOR, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, U.S. DEPARTMENT OF COMMERCE

Mr. KAMMER. Thank you, sir. I am very pleased to be here today reporting on NIST and also giving you some comments on the Fastener Quality Act. Commerce and technology are perhaps the two greatest forces that are shaping our lives today, and I would be hard-pressed to think of a more exciting place to be than at NIST, which is at the nexus of commerce and technology.

When I was being considered for confirmation to become the NIST Director, I identified five challenges that I intended to present to the NIST staff if I was confirmed and, as I was, I did present those challenges to the staff, and I thought I would use them as a context for reporting on what we have been doing and where we hope to go in the future.

The first of these challenges was to ensure that NIST provides the best measurement and standards to the U.S. economy and to U.S. industry and the rest of our society that are possible. This is the sort of a challenge that is never going to go away. It is a contin-

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uous challenge, and there is probably never a finish line, but NIST measurements are now pervasive.

Just to give you some sense of the significance of this, in the $350 billion a year electronics sector, NIST measurements provide the underpinning for accuracy for the 11,000 mammography laboratories in the United States. We also provide the standards that make the film that is used in the mammography predictable in its performance.

So the questions I asked the NIST staff were, how well are we meeting the needs of the United States now and in the future in measurements, how does our performance compare with the best in the world, and what do we need to do to become the best in the world if we are not, or stay the best in the world if we are?

We have had 14 workshops at NIST on different technical issues, all under this context, and I am pleased to report in many areas we are the best in the world. In a few areas we are not, and we are working on it, and in a few areas we concluded that U.S. industry would be well-advised to go to the best in the world if it did not happen to be us, so we are a pointer then to other people.

We reached a very significant milestone last month, with the support of this committee and the appropriators as well. We completed and dedicated the $75 million Advanced Chemistry Sciences Laboratory, and I want to report with some pride that we completed it on time and on budget, and it is a wonderful facility.

That emboldens me to request $95 million more for construction, which would be the amount of money that I would need to start construction of the $218 million Advanced Measurement Lab, which when completed, and it would take about 44 months, would be the best measurement laboratory in the world, the best physical facility for vibration and cleanliness, humidity, and temperature.

We have also included in this budget a $3 million request for critical infrastructure protection, and that is to work with the communications and information technology industries on security.

In addition to that, we are requesting $500,000 to start the TSTEP program, and in aid of starting that, we have reached out to a variety of experts already. We are not educators, even though we have a lot of educated employees, and we are getting their advice on how to do this.

The three notions that seem to be the most useful ones at the moment, support obviously for science and math teachers during summer breaks so that they can come and learn and get experience in a laboratory environment, perhaps creating model school-industry partnerships with high tech firms in localities where the teachers could work in those firms perhaps other summers, and Internet-based services so that teachers would be able to dial into, perhaps download and use in their classroom.

In the area of international standards, the challenge that I presented to the staff was to make sure that the United States becomes more successful in participating in international markets, where products standards are sometimes a nontariff trade barrier. World trade has been increasing at about 15 percent annually. Total U.S. exports are rising at about 9 percent annually, and exports to the European Union are growing at a little less than 5 percent annually.

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It is my view that product standards that are written under the International Standards Organization and International Electrical Technical Standards Organization tend to have a sort of European technology flavor to them, and we need to be present more to make sure that the standards that are used for buying and selling our products reflect U.S. technology and, therefore, U.S. jobs, so that was my second challenge to the staff.

We are requesting $2 million, half of that for physical comparisons of standards internationally to make sure that when U.S. companies sell their products they will be immediately accepted, and second, $1 million which we would propose to use to increase U.S. representation in the ISO and the IEC.

My third goal was to build a greater consensus on the Advanced Technology Pogram, and as ATP approaches its tenth year, we are beginning to amass quite a bit of evidence on the program's effectiveness. I think the jury's in. I think ATP works. Already, there is 120 new technologies developed with ATP funding and commercialized by industry. The leaders of the companies we have supported in many cases say but for ATP they would not have even started the project. Our request in 2000 for ATP is $239,000. That will allow $73 million in new competitions, new awards.

The challenge I set in the Manufacturing Extension Partnership Program was twofold. One was to increase the scope, the effectiveness of the program. We are pretty much at our full size. There is 2,000 technology agents out there. We are working with on the order of 20, 25 percent of the small and medium-sized manufacturers. There are almost 400,000 of them in the United States, though. We need to find ways to reach them more effectively.

The second part of the objective for MEP that I set was to receive authorization to continue Federal support for MEP centers after the sixth year. Thank you, sir, for providing that support. This committee gave us that permission last year. Our 2000 budget for MEP is $100 million, of which $1 million is to find the best ideas that are implemented in MEP centers and carry them to other MEP centers.

Then finally the Baldridge National Quality Program, the objective that I was deeply committed to and was fulfilled by this subcommittee again, was adding health care and education as quality work categories, and I am happy to report to you that the competition is underway.

We expect to receive proposals next month, and based on the mock competitions we have held I am optimistic that there will be some existence of proofs of truly quality education, and in education I expect to see wonderful examples in the K through 12 area, not just in advanced education.

So with that, if I can, I will make a somewhat awkward segue to the Fastener Quality Act, but give you a few comments on that. My belief is from reading the testimony and from consultations with your staff and the House staff, and seeing the House bill and the Senate bill, that we are all in a policy sense on the same page on the Fastener Quality Act.

There are probably technical issues that need to be tweaked to make sure that we do not have unintended effects, as has been the history of this piece of legislation in the past, but having said that,

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the fundamental recommendation that we make is based on a conclusion that we reach that in the last 10 years much progress has been made by the fastener quality industry.

The number and magnitude and problems uncovered in the 5-month study we just concluded appear to be very small in comparison with the problems in magnitude and number that we encountered a decade ago, so we think the Fastener Quality Act should be limited only to very high strength fasteners that are manufactured according to specific standards, either private consensus standards or governmental standards that require a grade mark.

Additionally, we would suggest that in order to encourage the use of quality management systems like QS 9000 in fastener manufacturing, that if someone is compliant with such a standard as QS 9000, that they be deemed to be compliant with the Fastener Quality Act simply with that fact.

We would also suggest allowing data associated with fasteners to be stored and transmitted electronically, and finally we would suggest amending title 18 of the United States Code to sort of turn up the issue of fraud in public and private commercial transactions involving fasteners, so in those few cases where there are people that are intentionally bilking the public the consequences will be quite significant to them.

So with that, thank you all for your attention, and thank you for inviting me.

[The prepared statement of Mr. Kammer follows:]

PREPARED STATEMENT OF RAYMOND G. KAMMER DIRECTOR, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, U.S. DEPARTMENT OF COMMERCE

Mr. Chairman, Members of the Committee, I'm very pleased to be back before you to report on the work of the National Institute of Standards and Technology and to discuss our plans for the future.

Commerce and technology are perhaps the two greatest forces shaping the world we live in. Global commerce has linked us all in a complex, world-wide economic ecology, one that is constantly reshaping itself to meet the rapidly accelerating pace of technological change. Leading economists estimate that technology accounts for at least 50 percent of the economic growth in this and other industrialized nations. I'd be hard pressed to think of a more exciting place to be in government today than at NIST, an agency that stands right at the intersection of commerce and technology.

Since becoming Director of NIST, I have outlined five principal challenges, goals, that I saw as crucial for NIST to meet as we enter the 21st century. This morning I'd like to briefly update you on our progress in meeting those goals and our plans for the next fiscal year.

MEASUREMENT AND STANDARDS LABORATORIES

First on the list was to ensure world leadership by NIST's Measurement and Standards Laboratories.

This is the sort of challenge that will always be important, and never will go away. The NIST laboratories are the ultimate U.S. reference point for measurements:

- Working with counterpart organizations throughout the world to provide industry and the scientific community with the equivalent of a common language needed at nearly every stage of a technical activity.
- Furthering the technical aims and capabilities of U.S. industry and serving as an impartial expert, developing highly leveraged measurement capabilities and other infrastructure technologies.

A couple of examples will underscore the breadth and importance of this work.

- NIST measurements are pervasive in the $350 billion electronics sector; the labs provide the microwave antenna measurements used by every major U.S.

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aerospace company and the national reference standards that support the accuracy of the electric power meters in every U.S. home and business. The measurement capabilities of the NIST laboratories provide the essential underlying support for the voluntary standards for the manufacture of U.S.-made optical fiber communications lines, an industry that competes in a $10 billion world market.

- In health care, among many other examples, the NIST labs provide national standards for the 11,000 U.S. mammography facilities and for exposure quality in the $10 billion U.S. photographic and X-ray film industry.
- In construction, NIST operates the foremost U.S. fire research laboratory and is the principal R&D agency working to reduce earthquake hazards through improved building codes and standards and practices for structures and lifeline.
- In the U.S. information technology sector, which adds $680 billion to the gross domestic product annually. The NIST labs develop test methods, computer science, and engineering methods that underpin metrology. They support economic growth through the Internet by developing test methods and security services for infrastructure, encryption, and data sharing.

I'm in no danger of running out of examples, and could go on at some length in this vein. Economic impact studies of NIST's laboratory programs show high rates of return and important benefits to industry.

A year ago I challenged the NIST staff to address directly:

- how well we were meeting the current and future measurement needs of industry and the country,
- how our performance compares with the best in the world, and
- what we need to do to be or remain at the top.

One result of this challenge was the "Best in the World" Staff Workshop series. Twelve workshops already have been held examining how specific NIST laboratory programs from time and frequency to fire-suppressant performance measure up against the best to be found anywhere in the world. We've identified potential opportunities for improvement, and are reviewing possible actions.

If this sounds to you like "benchmarking," by the way, it is. It is one example of how we have begun formally incorporating the Baldrige quality criteria in the management of NIST programs, another tool in our drive to ensure that we support U.S. industry and business with the best national standards program in the world.

And the NIST laboratories continue to produce world-class work. A few examples from this past year include:

- In a program conducted jointly with Sandia National Laboratories, NIST researchers are developing new measurement references for the semiconductor industry. Semiconductor manufacturers can now produce circuits with critical features too small to be reliably measured with existing technologies— features as fine as a tenth of a micrometer, about 500 times thinner than a human hair. With support from International SEMATECH and the Department of Energy, NIST and Sandia researchers have developed a first-in-the-world prototype measurement reference line 0.35 micrometers wide and are now working to apply the same concept to finer linewidths. The results will aid the electronics industry in monitoring the performance of microchip fabrication facilities.
- Working with the Center for Advanced Research in Biotechnology, NIST scientists recently helped determine the three-dimensional structure of an enzyme called threonine deaminase, a large biological molecule produced by the bacteria *E. coli.* The enzyme structure has long intrigued scientists as it has a switch on one end for turning itself on or off. Since the enzyme helps to produce an essential amino acid for *E. coli* bacteria, pharmaceutical researchers now can use its structure as a target for developing new antibiotic drugs. Because plants also use the enzyme, inhibiting it may offer a new strategy for weed control. Plastics manufacturers are interested in the enzyme because it produces a compound used to make biodegradable plastics. Modifications in the enzyme could improve efficiency in biodegradable plastic production.
- As you all are aware, businesses and governments world-wide are engaged in a race with time to uncover potential software errors that will be triggered by the so-called "Year 2000" or Y2K bug. This is not a trivial issue because in some cases hundreds of thousands or millions of lines of complex, often ill-documented code must be analyzed to determine if a problem even exists. These organizations now have a new tool in the form of NIST-developed algorithms that have been incorporated into commercial software designed to help find Y2K problems in programs written in the C language, one of the most popular languages for large, commercial and industrial programs. Programmers can use

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this software to figure out which of the lines of instruction—usually about 10 percent—need to be changed to conform to four-digit dates after the year 2000. NIST also established a year 2000 web site that provides businesses and individuals with information and software for assessing Y2K problems on their systems.

In addition to world-class work, another measure of the quality of the NIST laboratories is our world-class staff. This past year saw two particularly noteworthy honors:

- Physicists Eric A. Cornell of NIST and Carl E. Wieman of the University of Colorado at Boulder, both fellows of JILA, an interdisciplinary institute for research and graduate education in the physical sciences operated jointly by NIST and the university, were awarded the Lorentz Medal from the Royal Netherlands Academy of Arts and Science for their laboratory creation of the first Bose-Einstein condensate, a new form of matter predicted by Albert Einstein and Satyendra Bose more than 70 years ago. The medal, named in honor of Nobel Laureate Hendrik A. Lorentz, is awarded only every four years. Dr. Cornell and Dr. Wieman cooled rubidium atoms to about 170 billionths of a degree above absolute zero in a two-step process using laser and magnetic traps to create the unique condensate.
- NIST materials researcher John Cahn was named by President Clinton to receive the National Medal of Science, the nation's highest scientific honor. He was the only federal researcher to receive the medal in 1998. Dr. Cahn was honored as an original thinker who has applied fundamental scientific laws to the practice of solving down-to-earth problems, and whose contributions have influenced three generations of materials researchers, mathematicians, and solid-state physicists. Dr. Cahn is perhaps most widely known for his co-discovery in 1984 of materials now classified as "quasicrystals," which brought about a revolution in the field of crystallography.

Plumbing and air-conditioning ducts are less romantic than new states of matter, but when an aging infrastructure starts interfering with our research, we can no longer ignore it. The great majority of our laboratory, office, and support buildings in Gaithersburg, Maryland, and Boulder, Colorado, are 30 to 45 years old and are deteriorating at an accelerating rate. NIST has designed a master facilities plan to guide the replacement, renovation, or repair of these buildings so that NIST can continue to provide U.S. industry and science with the best possible measurement system.

We reached a significant milestone last month with the completion of the new Advanced Chemical Sciences Laboratory. This $75 million laboratory provides state-of-the-art facilities for the most demanding measurements in today's chemistry and biotechnology research. The new ACSL will rank with the best such facilities in the world and give us a badly needed physical platform to meet industry's needs for precision chemical measurements in microelectronics, genetic engineering, pharmaceuticals, environmental technology, and many other areas.

The ACSL construction project came in on-time and on-budget, the type of project management you can expect from NIST.

Our budget request for FY 2000 includes three items to support the NIST laboratories in providing world-class services for the nation. They include an increase in our facilities budget to enable us to begin construction on badly needed laboratory facilities and new initiatives in critical infrastructure protection and science and math teacher training.

While it is a major step forward, completion of the ACSL by no means solves our infrastructure problems. Our budget request for facilities funding directly addresses these pressing needs:

- We are requesting $95 million to be combined with $108.3 million already appropriated in FY 1998 and FY 1999 to begin construction of the Advanced Measurement Laboratory (AML). The AML will provide stringent controls on particulate matter, temperature, vibration, and humidity that are unattainable in current NIST buildings. The AML will allow NIST to provide U.S. industry and science with higher quality NIST reference materials, improved measurements, and faster access to NIST research advances. These new NIST laboratory facilities will be equal to, or better than, similar laboratories overseas. Such conditions are vital for housing the institute's most advanced metrology, physics, chemistry, electronics, engineering, and materials science research and will enable NIST to keep pace with rapid developments in semiconductors, industrial robots, computers, pharmaceuticals, and emerging technologies requiring molecular and atomic-level precision. The AML will be a shared resource for

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NIST and the industrial and scientific communities that work closely with NIST.

- We also are requesting $12 million to undertake the highest priority safety, capacity, maintenance, and major repairs tasks to ensure compliance with various federal, state, and local health and safety regulations, to make modifications needed to improve access for people with disabilities, and to keep the existing buildings in reliable working order.

Our economy and armed forces have become ever more reliant on sophisticated information technology. As the world's strongest power the United States is a natural target of computer attacks, both by organized forces and malicious vandals. Successful attacks on key information and communications systems or simple failures due to natural disasters or other events could damage and undermine the nation's entire economy.

Most existing computer and communications systems are vulnerable. If safeguards are added, they can be expensive and sometimes of questionable effectiveness. Cost-effective technology, measurements, and test methods are needed to help avert catastrophic failures of critical infrastructures due to terrorism, war, or human error and to reduce the fraud, waste, and abuse perpetrated through low-level attacks on the computer and communications infrastructure.

The President has called for a national effort to improve the security of critical infrastructures, and the President's FY 2000 budget has made critical infrastructure protection a major priority. DOC is designated as lead agency for the information and communications sector. NIST also has a legislated mandate for computer security.

Our budget request for $3 million for Critical Infrastructure Protection will enable NIST to develop needed measurements, test methods, and standards to help ensure the reliability, trustworthiness, and survivability of information technology systems supporting critical national infrastructures.

This initiative focuses on efforts in security technology, system survivability, high-confidence systems, security for supervisory systems, and security for federal systems:

- NIST will collaborate with industry to accelerate the convergence of standards for public key infrastructure (which includes the mechanisms, procedures, and policies for the deployment of public key cryptography) and the deployment of related products and components.
- NIST will develop metrics and test methods and establish testbeds to enable comparisons of products that promote system survivability both the ability to resist attack and to recover from disruption.
- Certain applications require ultra-dependability, such as air-traffic control or automated surgical and life-support systems in hospitals. If you combine two dependable systems, is the resulting hybrid also dependable? NIST will support the development of ultra-dependable computing technology through new methods of testing and assurance and through new techniques for combining dependable components into integrated systems.
- Supervisory systems are used to control processing in major industrial applications. NIST will develop measurement techniques to apply advanced security to two specific types of supervisory systems. The work then will be applied to all supervisory systems.
- In addition, NIST will work with other government agencies and the private sector to identify resources and cost-effective strategies for information and help federal agencies implement information assurance best practices.

Education is, for NIST, not so much a standards issue as an infrastructure issue, and one of the most critical. Science and technology are mainstays of U.S. economic competitiveness.

Although education is, of course, not our primary mission, educational programs have a long tradition at NIST. This is not purely altruistic—the future quality of the Institute depends on a continuing supply of bright, well-trained, motivated scientists and engineers. When we inspire students to pursue careers in science and engineering, when we inspire graduate students to consider problems in measurement science, we invest in our own future as an institution.

NIST's educational programs touch every level of the education system. They include:

- our internationally known post-doctoral research program;
- our popular SURF—Summer Undergraduate Research Fellows—program, that gives undergraduates interested in careers in physics, materials science

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and engineering a 12-week honors program involving them in hands-on research;

- REAP—Resource Education Awareness Partnership—and AIS—Adventure in Science. These are volunteer programs that reach students from grade school through middle school with science-oriented demonstrations and special activities; and
- a variety of other efforts, including mentoring programs, support for science fairs, and special tours oriented towards school children.

Most of these programs are aimed at the student. But one very important way of improving science and math education is to enhance the training and development of science and math teachers, which we were authorized to do under PL 105-309.

In FY 2000 we are requesting $500,000 to begin a highly leveraged program to enhance the professional development of science and math teachers in the K-12 schools nationwide. Among the approaches to be explored through this initiative, called the Teacher Science and Technology Enhancement Program are:

- support for professional enhancement of U.S. science and math teachers during the summer hiatus;
- model school-industry partnership programs linking schools with local high-tech firms to provide support and technology resources;
- Internet-based services to create on-demand, net-based science and technology enrichment resources for teachers.

We have been discussing our initiative with state, local and national educational experts to obtain their suggestions and guidance. This past December we met with approximately two dozen of these experts, including representatives from National Council of Teachers of Mathematics, the California School system, professional science societies, and other federal agencies. We wanted to survey what works in teacher education enhancement and what gaps exist. We also have met with colleagues at the White House Office of Science and Technology Policy, National Science Foundation, U.S. Department of Education, U.S. Department of Labor, and the National School to Work Office to gain their advice and assistance to more clearly define the goals of the NIST program.

NIST staff have met with educational officials and experts in New York state, New Hampshire, Maine, and Kansas and we will be meeting with representatives of California and New Mexico for their suggestions on our implementation of this program.

Because the proposed funding is modest relative to the scope of the challenge, NIST will seek collaborations with other federal agencies, national education organizations, and the private sector for greatest leverage of federal funds.

INTERNATIONAL STANDARDS

The second challenge I outlined was to ensure that measurement capabilities and standards are in place to support full U.S. participation in global markets.

This committee is well aware of the importance of trade to the U.S. economy. Exports account for a third of the growth of the economy. In 1997, total U.S. exports amounted to $960 billion, supporting one in five U.S. manufacturing jobs and accounting for 2 million new jobs in the past four years. Export-related firms create new jobs, increasing employment 20 percent faster than companies that do not export, are less likely to fail, pay higher wages (15 percent higher, on average) and generally provide better benefits. And yet, while world trade has been increasing by 15 percent annually, total U.S. exports have risen only 9 percent, and exports to the European Union are growing at less than 5 percent annually.

Why? In part this is because local or regional technical standards are adopted that serve as barriers to U.S. exports. Advancing local or regional technical standards as international standards to secure a trade advantage for one's own products is a well-recognized gambit, and some of our overseas competitors play the game far more aggressively than we do. The Federal Republic of Germany, for instance, has invested $40 million in metrology and standards projects in South America. They spend more in Brazil alone than NIST's entire budget for foreign metrology issues.

Of course we have to recognize the significant differences in our systems. In contrast to the centralized, federal standards system in Germany, for instance, the United States relies on—and has been served well by—a decentralized, voluntary, consensus-based system largely managed by the private sector. It is a system that has promoted innovation and technical excellence, but it is highly fragmented, making it difficult to contend with unified, well-organized challenges from abroad.

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NIST has long experience in working with all elements of the complex U.S. standards community, with NIST scientists and engineers serving on and providing technical assistance to hundreds of individual standards bodies. We also work internationally to assure compatibility of our national measurement standards—fundamental measures like the second and the meter—with our international counterparts.

This past year we inaugurated a new and innovative service to advance and harmonize measurement capabilities throughout the Americas, furthering hemispheric goals of free trade and increased scientific cooperation.

SIMnet—SIM for Sistema Interamericano de Metrologiμ—is an Internet-based, interactive system intended to support real-time comparisons of measurements performed at laboratories throughout the Americas. Launched last December for two years of pilot testing, SIMnet replaces complex and time-consuming "round robin" exchanges of equipment and personnel between nations with a network of personal computers, videoconferencing technology and software for data sharing and remote control of equipment. Over SIMnet metrology scientists can work collaboratively and remotely. Scientists in participating countries will be able to observe staff in another nation as they perform a measurement comparison. Remote observers will be able to share customized measurement software, review data as they are collected, ask questions, serve as consultants to the measurement institute performing the comparison, and even operate equipment located at their distant colleagues' laboratories.

SIMnet will help create a flexible, nimble and accurate measurement system shared throughout the Americas, a system essential to the envisioned Free Trade Area of the Americas. The pilot SIMnet program will focus on electrical measurements needed for many products and processes. Countries participating in the pilot include Argentina, Brazil, Canada, Colombia, Costa Rica, Ecuador, Jamaica, Mexico, Panama, Trinidad and Tobago, Uruguay and the United States.

While SIMnet stands as a significant advance, much work remains to be done. Comparisons of U.S. national measurement standards with those of other nations are essential to ensure that American products are not rejected simply because of disagreements over the methods used to perform a measurement or test.

We are requesting $2 million in our FY 2000 budget for a coordinated effort to remove or avert technical barriers to trade by increasing worldwide recognition of U.S. measurements and standards and streamlining the domestic standards development process.

NIST has for years maintained a certain level of international intercomparisons in traditional measurement standards, such as physical, electrical, and radiometric measurements. But as new technologies emerge and national economies grow, the number and frequency of such comparisons are rising, requiring NIST to expand its activities in these areas. In addition, new technologies and industries are demanding the development of new and improved capabilities in fields such as information technology and biotechnology.

Chemical measurements have become increasingly important on the international scene. NIST, with its program of Standard Reference Materials, has long been the world leader in chemical measurements. But to meet current and anticipated demands we will have to expand our portfolio of SRMs and seek agreements with trading partners assuring mutual recognition of each partner's standards. Target areas will include important U.S. export sectors such as automobiles, fuels, pharmaceuticals, medical diagnostics, and food.

NIST also will develop capabilities to help U.S. industry meet the European Union's new requirements that products generate no harmful emissions and be immune to electromagnetic disturbances. Further, NIST will resolve and unify U.S. and international standards efforts for coordinate measuring machines, which are becoming common in automotive, aerospace, heavy equipment, and machine industries. These machines provide highly accurate dimensional measurements of mechanical parts with complex shapes.

As part of this initiative, NIST will help to increase U.S. participation in international standards development by providing $1 million to the American National Standards Institute (ANSI). ANSI is the official U.S. representative to the International Organization for Standardization and the International Electrotechnical Commission. An expanded infrastructure of technical measurements and standards coupled with ANSI's strong leadership and participation in the international standards arena will support the growth of U.S. exports by reducing or eliminating technical barriers to trade.

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ADVANCED TECHNOLOGY PROGRAM (ATP)

My third goal was to build greater consensus on the Advanced Technology Program's value.

As the ATP approaches its tenth year, we are massing more and more evidence of the program's effectiveness. The jury is in on the ATP—the program works.

The ATP has developed a comprehensive evaluation strategy that includes statistical profiling of projects, real-time monitoring of project developments, microeconomic case studies that detail outcomes over defined periods, and macroeconomic projections of long-term program and project impacts. I believe it to be one of the best developed, most thorough-going evaluation systems in government. And it is demonstrating results.

Already approximately 120 new technologies developed with ATP funding have been commercialized by industry. The ATP is successfully improving the capabilities of U.S. businesses to generate economic returns from scientific and technological innovations for the nation.

For example, the status reports on all ATP projects completed as of March 1997 show that technologies developed by 15 of the 38 completed projects have been incorporated into commercially available products or services, and that the economic benefits are expected to be broad in scope and large in magnitude.

According to a recent ATP study of more than 200 projects funded from 1993 through 1995, ATP is:

- generating high-risk, high-impact technologies. As intended, ATP projects go well beyond incremental advances on existing technologies. Seventy percent of the project companies reported a broader project scope and/or higher level of technical risk than could be supported by industry alone, 29 percent of the planned applications were expected to result in performance improvements of 100 to 500 percent or more, and 35 percent of the applications represent "new-to-the-world" solutions;
- fostering collaboration. Collaboration has helped 78 percent of organizations to achieve project goals (85 percent of those organizations reported that ATP was responsible to a great or moderate extent for the collaboration); and
- accelerating the development and commercialization of advanced technologies. Eighty-six percent of organizations said they would not have undertaken the project without the ATP or were significantly ahead in their R&D cycles as a result of ATP funding. (The only reason that figure is not 100 percent is because the survey respondents included all joint-venture partners, including some companies working on only a part of the entire project.)

What sort of advances has come out of the ATP? They cover a broad range that reflects the diversity of companies, large and small, that have partnered in the program.

The ATP has gained some recognition as one of the early investors in the now burgeoning field of DNA analysis. The ATP provided critical early funding for the development of powerful new technologies that offer extraordinary advances in speed and convenience of DNA analysis. These technologies are rapidly advancing our capabilities to decode genes, manage diseases, discover new drugs, and cut costs in the trillion-dollar U.S. health-care industry.

The first of these systems are initial spin-offs of an ongoing ATP joint venture aimed at making low-cost, hand-held diagnostic devices for quickly analyzing DNA samples in doctors' offices. The devices will feature a combination of technologies developed by two small biotechnology firms in California. Affymetrix, Inc., adapted a photolithography manufacturing process to make postage stamp-sized DNA chips, which contain hundreds of thousands of gene sequences that detect matches in blood or tissue samples up to 100 times faster than conventional methods. Molecular Dynamics has introduced a system that sorts and sequences DNA in 96 tiny capillaries (tubes the size of a human hair) faster and more efficiently than traditional methods.

In electronics, researchers at Texas Instruments and NanoPore, Inc., a small New Mexico company, collaborated on an ATP project to create a practical, new insulating material to meet the requirements of the ultrafast integrated circuits of tomorrow. Entraining air, nature's ideal insulator, in microscopic glass bubbles they developed a novel insulator, xerogel, which was incorporated into an integrated circuit for the first time as part of an ATP project. As a follow up, the researchers combined a specific xerogel formula with a new technique for replacing conventional aluminum wires in integrated circuits with copper, a better conductor. The result: a new technology that could mean a 10-fold increase in microprocessor speed and vastly more powerful computers, cellular telephones, factory control systems, and

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other products. The innovation demonstrates a practical solution to a critical microelectronics problem: how to pack more circuits into smaller spaces without producing "cross talk," the jumping of signals between unconnected wires.

In manufacturing, the ATP supported major project involving a broad coalition of large and small companies under the National Center for Manufacturing Sciences to developed a suite of advanced technologies for machine-tool spindles—the part that holds the cutting tool on a rotating shaft. Don't be fooled by the apparently low-tech nature of a spindle. The multidisciplinary team assembled for this project developed a suite of innovations with literally "revolutionary" impact. The new design has the potential to save as much as $6 million annually in the production of a single part. It's unique bearing design won an R&D 100 award for technological innovation.

In the spirit of constant improvement, we continue to examine the ATP for opportunities to maximize our resources, and produce the maximum impact. This year, for example, we are experimenting with a new structure for our project competition that draws on the best features of the general and focused-program competitions we have used in previous years.

With results like those I have mentioned and stable funding for the ATP, I believe we can count on broad and strong industry support for the ATP, even though participating in the program requires industry to commit significant resources to the broadly enabling technologies the ATP fosters. We saw a demonstration of this last November when the ATP held its first large-scale national meeting in Atlanta to discuss program plans and explore technology roadmaps with industry. The meeting threatened to become something of an embarrassment only because the industry turnout was far heavier than our most optimistic dreams, and many sessions were standing-room-only.

Our FY 2000 request for $239 million for the ATP will enable us to continue multi year projects selected in previous years; conduct a new competition open to all areas of technology; and continue to implement a multifaceted economic evaluation program that includes statistical profiling, microeconomic case studies, and macroeconomic projections of long-term project and program impacts. The request, when combined with anticipated carryover and prior year recoveries, will permit approximately $73 million for new awards.

MANUFACTURING EXTENSION PARTNERSHIP (MEP)

The challenge for the Manufacturing Extension Partnership was to continue expanding access to services for more small and medium-sized companies and to receive authorization to continue federal support for MEP centers after the sixth year.

We were successful in receiving the latter authorization, and the MEP has continued to expand its client base. More than 2,000 manufacturing specialists and professional staff now provide services through more than 400 MEP-affiliated centers and offices across the country, reaching approximately 26,000 small- and medium-sized enterprises in 1998, a nearly 20 percent increase over the previous year.

As you know, the MEP provides small and medium-sized manufacturers with access to technologies, resources, and expertise specifically tailored to their needs. Working through state and local governments and local extension service providers, MEP centers can design programs based on the unique needs of local businesses.

Key to this effort is keeping abreast of the client's needs. As part of the Small Business Working Group of the President's Council on Year 2000 Conversion, for example, the MEP, working extensively and in close coordination with all the MEP Centers, is now offering seminars and a computer-based tool to help small businesses better understand and deal with the year 2000 date problem.

The tool—called Conversion 2000: Y2K Self-Help Tool—is helping small manufacturers and others conduct an inventory of equipment, including hardware, software and embedded systems; identify core business systems and rate their importance to the survival of the business; develop contingency plans; and plan and manage remediation projects. MEP's web site also features resources, tools, and references aimed at helping smaller companies combat the year 2000 computer problem, and NIST recently established a Y2K Help Center Hotline which provides technical support for users of the Y2K Self-Help Tool. (1-800-Y2K-7557)

With the $21 million increase in funding awarded to MEP in the Fiscal Year 1999 Emergency Supplemental Appropriations, MEP is able to work with even more smaller manufacturers and provide much needed Y2K assistance through a combination of adding additional field staff and consulting resources. In addition, to further reach small businesses MEP is working in collaboration with the Small Business Administration and the Department of Agriculture to develop seminars and workshops to train field staff personnel to address Y2K to increase outreach to their

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respective client base as well. Support will include additional training on the Conversion 2000: MEP Y2K Self-Help Tool kit, a CD-ROM self assessment tool that helps organizations to evaluate their exposure to the Y2K problem and devise contingency and remediation plans.

We also provide a MEP Web Site Resource Support for companies using the Self-Help Tool to implement a Y2K project. This partnership also has set up a Y2K Help Center for Small Business, which is staffed by skilled analysts trained to assist small businesses with their Y2K project questions. More information on the Y2K assessment tools or how to help smaller manufacturers and businesses in your area please can be obtained at the Y2K hotline at 1-800-Y2K-7557 or through the web site at http://y2khelp.nist.gov.

The Department of Commerce has decided to take the CD-ROM-based self assessment tool international and is translating the tool and accompanying material, such as the users manual, into seven foreign languages. DOC is distributing the CD-ROM through U.S. embassies around the world, and through a series of Y2K conferences which DOC is planning in 14 countries.

To optimize center performance and further increase the competitiveness of smaller manufacturers, two efforts were initiated recently:

- the Baldrige National Quality Program evaluation criteria have been adopted as a framework for generating continuous improvement in MEP-funded center performance and impact
- an integrated knowledge management system is being developed to facilitate the sharing of best business practices among the centers.

Our FY 2000 budget request of $100 million for the MEP includes an initiative of $1 million in new funding to gather, promote, and effectively deploy to all MEP manufacturing extension centers the highest priority best practices in areas such as employee development and service delivery, both to enhance center quality and effectiveness and to introduce new services quickly to help small and medium-sized businesses compete in global markets. Currently, MEP is able to provide only very limited best practice information to centers. Funding under this initiative will enable MEP to accelerate its efforts to meet center demands for best practices information in the areas of center operations, center business practices, and service delivery.

The FY 2000 budget request also proposes a decrease of $9.1 million in MEP funding. This decrease reflects a lower federal share of the centers' operating costs since the federal share changes as the centers mature. In the first three years, the federal share is 50 percent; in year four, 40 percent. In years five and six and for renewals, the federal share is one-third. The number of centers will not change as a result.

BALDRIGE NATIONAL QUALITY PROGRAM

The final challenge was to promote performance excellence in health care and education, particularly among non-profit organizations, through the Baldrige National Quality Program.

I'm pleased to report that we are well on the way to achieving this goal. We received authority to make Baldrige awards in both the education and health-care sectors, which join the existing Baldrige categories for manufacturing, service, and small business this year for the first time. The new Baldrige Criteria for Performance Excellence in health care and education, the products of many months of research and testing with those communities, have just been released.

We're very excited about this. Since its establishment, the National Quality Program has been recognized as a focal point for strengthening America's competitive position. The program helps many types of companies and organizations deliver ever improving value to customers while improving overall organizational effectiveness. It creates a performance excellence standard that fosters communications and sharing in the private sector, building networks to deliver performance and quality management information and services and to share lessons learned with other economic sectors. Extending this influence to two of the sectors that most profoundly affect our day-to-day lives promises significant benefits for our economy and our society.

The Baldrige National Quality Program has proven to be highly effective in stimulating interest in performance improvement, excellence, sharing and cooperation, and the creation of new information networks within the business and public sectors. Collectively, Baldrige Award recipients, examiners, and NIST staff have given more than 50,000 presentations at conferences worldwide. With a relatively small annual federal investment, the Baldrige program leverages over $100 million in-kind contributions from the private sector and state and local governments.

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And the market has demonstrated that quality translates to productivity and profit. The "Baldrige Index," a fictitious stock fund made up of publicly traded U.S. companies that have received the Malcolm Baldrige National Quality Award between 1990 and 1997, continues to outpace the S&P 500, currently by about 250 percent.

Extending the Baldrige program to health care and education is a development which has received strong support from those communities—and especially from the business sector. The private-sector Foundation for the Malcolm Baldrige National Quality Award has committed to raise $15 million to endow the health care and education awards.

The FY 2000 appropriations of just over $5 million will be used to manage the annual award competition, conduct a conference at which Baldrige award winners share their performance excellence strategies, maintain a comprehensive database on state and local quality awards, continually improve the performance excellence criteria that serve as the national standard, and facilitate information sharing among all sectors of the U.S. economy.

A year ago I proposed five goals for NIST to pursue as we enter our next century of service to U.S. industry and commerce. In the intervening months we have made strong progress in meeting all of those marks, but—as usual— challenges remain.

- We must continue to modernize and strengthen our laboratory facilities, to ensure that NIST's scientist and engineers have the resources they need to meet industry's demands for excellence in standards and measurements.
- We must continue to work closely with the U.S. industrial standards communities and the international standards community—in the face of ever-growing international competition—to lower barriers to U.S. exports.
- We must aggressively press the proven Advanced Technology Program strategy, accelerating the development of broadly enabling technologies for the U.S. through cost-sharing in high-risk R&D projects.
- We must continue to promote quality business practices for improved performance and productivity nationally through the Baldrige National Quality Program and the Manufacturing Extension Partnership, and, as importantly, continue to improve the quality and efficiency with which we deliver those services.
- Perhaps the greatest challenge: we must do this within the necessary constraints of the tight budgets dictated by national priorities and fiscal prudence.

This year's budget, Mr. Chairman, represents a good balance between fiscal restraint and the key initiatives that will allow NIST to meet the needs of technology and commerce as we enter the next century. Mr. Chairman I would now like to turn to a discussion of issues related to the Fastener Quality Act (FQA).

I will briefly describe the study on the FQA conducted by the Department of Commerce, our findings, and our recommendations.

Public Law 105-234 was signed by President Clinton on August 14, 1998. The law delayed implementation of the FQA until the later of June 1, 1999 or 120 days after the Department of Commerce submits a report to Congress on the FQA. The law directed that in the report the Department recommend changes in the Act that may be warranted based on changes in fastener manufacturing technology and the existence of other regulatory programs covering fasteners. The Department also considered (1) whether fastener problems may represent a current threat to public safety, (2) whether imported fasteners pose the same threat as they were perceived to 10 years ago, (3) how the military and other federal agencies have improved their procurement practices since 1990, and (4) concerns expressed by industry about the Act as written.

The Department published a Federal Register notice on October 7, 1998, requesting information from the public on all relevant issues. More than 600 pages of comments were received from 137 individuals and organizations.

The American Society of Mechanical Engineers (ASME) conducted a three-day workshop for the Department, November 9-11, 1998, in Chicago, Illinois, to document how fastener manufacturing technology has changed since 1990. Representatives from 63 industrial companies from the United States, Canada, and Europe, as well as 7 government agencies and 9 non-profit universities and associations attended the workshop.

Staff of the Defense Industrial Supply Center (DISC), the National Highway Traffic Safety Administration (NHTSA), the Federal Aviation Administration (FAA), and the National Aeronautics and Space Administration (NASA) supplied substantial information directly to the Department on either documented problems related to fasteners in programs that regulate public safety or improvements in fastener procurement practices made over the past decade.

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In analyzing all available information, the Department concluded there have been a number of positive changes in the fastener industry since the FQA was passed. There are occasional problems but the number and magnitude of problems uncovered in this five-month study appear to be relatively small compared to a decade ago. In addition, there have been significant improvements in military and federal procurement of fasteners and significant advances in fastener manufacturing technology. I will cite a few examples from the DOC report, copies of which have been provided to the committee.

In analyzing 41,000 entries of airplane accidents and incidents in the National Transportation Safety Board's database dating back to 1983, less than 1% could be attributed to fasteners and most of those appear to have been caused by problems other than fastener quality.

On the other hand, we found a mid-1990s report of a Norwegian commercial aircraft that crashed killing 55 people when its vertical stabilizer and attached rudder broke from the fuselage. A three-year investigation conducted by Norwegian authorities found that the bolts holding the stabilizer were only 50% of their specified hardness.

The U.S. Customs Service has been conducting spot checks of imported fasteners since 1991 to determine if the fasteners meet the specifications for the grade indicated. From 1991 through 1997, all spot checks have indicated no more than 1% fastener failures that Customs attributes to poor quality control by the manufacturers. However, they currently have an open investigation on a 5% nonconformance rate discovered in the January-April 1998, spot check.

During the period from just prior to enactment of the FQA through today, the automobile industry has been subject to fewer than 20 recalls where fastener quality was the problem. The percentage of all recalls involving fastener quality has been less than 1%. Very few accidents occurred in conjunction with these recalls and there were no fatalities for all the vehicles involved.

The fastener procurement practices of the Defense Industrial Supply Center (DISC) was a major focus of investigation during the 1980s leading up to the passage of the FQA. During the 1990s, DISC has instituted major new procurement practices including a Listing of Fastener Manufacturers Identification Symbols, 100% testing of lots of "flight safety critical fasteners," and the use of a Qualified Suppliers List Program for both fastener manufacturers and distributors. DISC has checked military inventories over the past four years and found no evidence of widespread problems with substandard or mismarked fasteners. Any instances of misconduct by fastener suppliers are quickly addressed.

The Department concludes that there have been a number of positive changes in the fastener industry since the FQA was passed. The number and magnitude of problems uncovered in this five-month study appear to be small compared to a decade ago. In addition, there have been significant improvements in military and federal procurement of fasteners and significant advances in fastener manufacturing technology. If Congress determines that it is appropriate to continue to regulate fasteners, the Department recommends Congress amend the Act as follows to limit its application to fasteners where public safety may remain a problem.

The Department recommends that coverage under the Act be limited to only high strength fasteners manufactured to consensus or government standards that require a grade mark. By this we mean fasteners having a minimum tensile strength of 120,000 psi, the level above which grade markings on fasteners are normally required. We recommend exclusion of fasteners whose specification merely reference consensus or government standards. For the most part, they are made for major end users like the automobile industry who are able to ensure they receive precisely the part they seek.

Additional recommendations include:

1. Encouraging the use of quality management systems like QS 9000 in fastener manufacturing by deeming fasteners from a facility registered to such a system to be FQA compliant,
2. Allowing required reports and certificates to be transmitted and stored electronically, and
3. Amending Title 18 of the United States Code to specifically address fraud in public and private commercial transactions involving fasteners.

In conclusion, the Department has completed the required study of the Fastener Quality Act.* We are prepared to assist you in further deliberations on the future

*Note—The information referred to has been retained in the Committee files.

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of the FQA if you so request. Thank you for your time and I would be happy to answer any questions.

Senator FRIST. Thank you very much. Let me say the committee has received testimony from several fastener manufacturers. I would request that NIST review those and comment on their concerns. Copies will be provided after the hearing, but it would be very useful to have that feedback as well.

Mr. Bachula, over the past few years the subcommittee has heard several testimonies about the growing commercial space market as we project into the very near future. As part of the Technology Administration Act of 1998, the Office of Space Commercialization was created within the Department of Commerce. Can you provide us with an explanation of where the office is located within the Department, and also comment on the current budget for the office?

Mr. BACHULA. Yes, Senator. We thank this committee for providing authorization for the Office of Space Commercialization in the Technology Administration Act of 1998. As you know, the office existed prior to that, but the act last year allowed us to consolidate our efforts and to clearly establish the office as the lead coordinating activity within the Department of Commerce.

Several years ago the prior existing Office of Air and Space Commercialization was located in the Office of the Secretary of Commerce. About 3 years ago, by agreement with the Secretary's Office and Under Secretary Mary Good, it was transferred to the Technology Administration. The office now reports to the Under Secretary. Its functions really are to do three things. One is that within the Department of Commerce it is to coordinate the various interests of the various agencies within the Department.

As you know, space is an important issue. NOAA puts satellites up, and concerning the regulation of remote sensing satellites, the Bureau of Export Administration has a role to play with respect to exports. The International Trade Administration, of course, promotes trade in this arena. The National Telecommunications and Information Administration helps to add new spectrum for things like GPS and communications satellites.

So our office attempts to bring all those things together within the Department and have a unified position when we go to other fora, and one of those other fora are other Government agencies. We are the advocate for commercial space interests in interagency efforts that involve the State Department, Defense, NASA, and other Federal Government agencies. Our goal is to advocate the commercial space industry, which is a rapidly growing one, and not only do that within the Government policy circles, but very often in negotiations with other countries, Japan and Europe and so forth, on issues such as global positioning systems.

Senator FRIST. What is the budget for the office?

Mr. BACHULA. The budget is approximately $500,000.

Senator FRIST. Mr. Kammer, during discussions last year in the authorization bill for NIST, the focused areas of competition and ATP were deemed by the administration as mandatory for the program's success, yet in November of last year they were eliminated by NIST from the upcoming solicitations. What was the basis for that decision?

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Mr. KAMMER. We have been trying to strike a middle ground. As I mentioned, I am trying to build a consensus. I think ATP is a very important notion, and one of the questions we asked ourselves as we thought about the comments we were hearing from people is, where is the middle ground, is there another way to do it, and the thought that occurred to us is, we continue to work with people on focus programs, and we can talk about strategies, and we can share information, but then we can hold a competition which is an Olympic competition, and when the proposals come in I am setting up a number of different review groups.

There will be a review group that focuses on material sciences and another one on life sciences so the people who make the proposals can get the benefit of being reviewed by experts in their field as opposed to when you just have a general panel you might have one life science guy, a materials guy and a computer guy, yet we have not made the decision that there shall be $20 million spent on this particular issue, which has let the proposals, the force of the proposals and their quality decide who gets what money, and we are hopeful that people will see this as something of a middle ground and be a little more comfortable with it, and maybe we can build consensus on that basis.

Senator FRIST. Can you also elaborate on the administration's proposal to exempt the ATP program from contributing to the Small Business Administration program?

Mr. KAMMER. Yes. The thought here is the way the ATP program operates, with very fair, very open competitions, and then manages the program and indeed selects, as it happens—more than 50 percent of the winners are small and medium sized business in any event—is a better way than the SBIR process, which dictates the dollar amount, the specific amount, and frequently results in simply a paper report as opposed to actual activity, and on that basis we thought to propose for your consideration, at least, viewing the ATP program as already a good instrument for small business.

Senator FRIST. Thank you very much. Senator Breaux.

Senator BREAUX. Thank you, Mr. Chairman. I thank the panel for their testimony.

Mr. Bachula, let me talk a little bit about the satellite launch vehicles. I understand your agency is undertaking a study to assess the competitiveness of U.S. space commerce and the business in this area. Can you tell me a little bit about what you hope to accomplish with that?

Mr. BACHULA. The study we are doing right now is a look forward in terms of the emergence of the space business in a variety of areas, and it is an attempt to look over the horizon so that it does not look so much as what we are doing today, but what we might be doing 5 or 10 years from now.

One thing is very clear from that, is that business is growing d[illegible]ically. We estimate that space commerce could be as much [illegible]0 billion in the year 2007, and that will require many, many [illegible]launches than we are capable of doing today, in the United S[illegible]right now, as you know, Senator, very well.

[illegible]nk [illegible]re up to 47 percent market share last year, but [illegible] up fr[illegible] the thirties the year before, and we have many [illegible] c[illegible]ions satellites, DirecTV satellites, mobile tele-

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phone satellites to launch than we have domestic capability to do so, and that provides both the competitiveness and a national security problem.

Senator BREAUX. As you know, we have been involved in legislation to seek a loan guarantee type of program to U.S. private industry to make the launch vehicles easier to build and to afford. This legislation would allow for adequate financing for them without having the Government build the vehicles but have the Government have some role in it.

Is your study looking at possible ways to increase competitiveness, or is it just analyzing the problem? Are you going to hope to make recommendations on what we might be able to do, and in light of all that, do you have any thoughts about the legislation that we are trying to use as an approach?

Mr. BACHULA. We have held two workshops. I held a workshop out on the West Coast with about 10 small companies that were involved in trying to grow launch services, particularly advanced ones where the cost per pound is a lot less than today, as well as some larger companies, Lockheed and so on, and the Deputy Secretary of the Department, Robert Mallett, was at the National Space Symposium a couple of weeks ago and he also met with a group of representatives from the space transportation industry, and I think that we have concluded that some sort of financial incentives are going to be needed in order to stimulate private investment required to get a lot of these new launch ventures literally off the ground, if you pardon the expression.

Whether that takes the form of loan guarantees, tax incentives, advance purchase agreements, it might take all or some mix of those, but we think something is going to be needed in this regard. It takes a lot of money, and the capital has to be patient. It has to be 5, 6, 8 years out.

So I think there are things we can do, and we know that your bill is modeled on the shipbuilding activities in DOT, which has worked very well there, and so we think there is a lot of merit there.

Senator BREAUX. Well, I appreciate that. I mean, I am just trying to be helpful. I think that some type of assistance by the Government without the Government running the program and owning the launch vehicles is where we are headed. It is kind of a joint partnership between the Government and business to try to make us more competitive in this area.

I just do not want us to have to continue using large vehicles, or we are going to get in trouble with that. When these other countries have vehicles that do not perform properly our industry is going to be called upon to help fix them, and then we get in problems with transferring technology while we are helping other countries fix their vehicles which are launching our satellites. It is a vicious cycle that we have to, I think, correct, and one way to do it is to allow industry to be able to have their own launch vehicles, so hopefully we can work together on that.

I know Senator Rockefeller mentioned this, but I am also concerned about the EPSCoT program. Apparently, from what information we have, the administration is proposing cutting $1.7 mil-

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lion from the fiscal year 1999 level of $2.3 million, and awarding no grants in the 2000 fiscal year.

What can we do? I mean, what do we have to do to say this is a priority, that it is important, particularly for a number of States like Louisiana, West Virginia and others?

Mr. BACHULA. I am glad you asked that question. The EPSCoT program, as you know, arose out of discussions with this committee several years ago, and was authorized by this committee, and we have had 2 years of funding. In fiscal 1998 we ran our first competition. We had 25 States, or groups of States apply. We awarded seven projects in a total of 10 States. There was a couple of multi-State activities for a total of about $3 million of activities, about half of which came from the Government, and I would like to mention one particular project to give you an example of what that does in a second.

This year, in fiscal 1999, we have a little over $2 million to award. The competition is open. It goes to about May 14, and we expect to give another 6 or 8 or 10 projects.

The Administration's request for next year is basically enough money to do an evaluation of the first two rounds, to do some stakeholder contact, to take a look at the program, did we have the right criteria, did we have the right process, what did we sort of get in this round so that we can do a course correction and then move forward.

I am very confident that that evaluation is going to say that this is a good program, that there is merit to it, that there is need, and that there is a significant demand out there for this kind of effort.

Let me give you an example of one of the projects that we funded this year, and it is in your State of Louisiana. We gave a grant to——

Senator BREAUX. I am surprised that is the example you pick.

[Laughter.]

Mr. BACHULA. The Louisiana Board of Regents, in partnership with the Louisiana Partnership for Technology and Innovation and the Louisiana Economic Development Council, and one of the great things we are finding about EPSCoT is this bringing together of units of economic development in the State government, the science and technology folks in that State, and university people, in new kinds of partnerships that have not existed in these States before.

This effort will coordinate the university's agenda with the State's agenda in six technology clusters, medical and biomedical, micro manufacturing, software, Internet, and telecommunications, environmental food technologies, and materials, and it is also going to look at three regions in the State, the north, central, and south, and develop local regional strategies. It is a $250,000 Federal grant matched by local folks, and we think the value extends way beyond the dollars because of the partnering that goes on.

We think the EPSCoT program is a very good program, and the fundamental reason why there is not a budget request for new grants in fiscal year 2000 is the budget process. It is the budget priorities.

Senator BREAUX. I appreciate that. You really do get a tremendous bang for very few bucks in this area. I mean, you are talking about a $250,000 grant that brings all these various departments

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together to get them to be more cooperative and more efficient in what they are attempting to do. I would suggest, Mr. Chairman, talking about the EPSCoT program, since we are all interested in it and since we have the chairman of the Appropriations Committee on this committee and one of the Ranking Members in Senator Hollings we ought to be able to get together and jointly try and be of help in this area. I think it would be very, very important.

Thank you.

Senator FRIST. Thank you, Senator Breaux.

Senator Rockefeller.

Senator ROCKEFELLER. Mr. Bachula, the thing that makes me want to carry this a step further is that I hear your words, I heard your testimony, and EPSCoT got a sentence, which was fine. Then I hear your words to Senator Breaux, but we have heard directly from somebody in the Department of Commerce that it does not intend to renew this at all, and so I cannot just be sanguine about it.

To say, because of the budget process and the restrictions and all the rest of it—you know what the e-rate is?

Mr. BACHULA. Yes, sir.

Senator ROCKEFELLER. Now, let us suppose that we had decided—we started the e-rate and we were just going to do it for a year, then suspend it. Now, the e-rate, like everything else that has to do with technology and ATP and everything else that has controversy associated with it, if anybody wants to sort of bury something for good, then the way to do that is to stop for a year and analyze what it has done.

Now, I think this reaches the level of the absurd when you are talking about $2.3 million, which is then cut by $1.7 million. Seven grants, maybe you will do another seven or something like that, and then for an entire year the Technology Administration sits back and says, now, what have we really done here, and how could we do this better.

I mean, that is the kind of thing, first of all, that if you are going to do it, it should be ongoing. You do not stop a program to evaluate it. If you stopped the e-rate for a year, you would never see it again. You would flat out never see it again, because the world would close in on it. There are always people unfriendly to new ideas and when you get into technology, even more so.

So I am really dissatisfied by the answer that we want to sit and study this thing to find out if we are doing the right thing. You have only been doing it for a year, and not much of that, and you are talking about, what is it going to be, $600,000 next year? I mean, am I just wrong? Did I get out on the wrong side of bod this morning, or what happened? What am I missing?

Mr. BACHULA. Senator, you are very right. Let me——

Senator ROCKEFELLER. I mean, it seems to me—and you are from the administration. You cannot buck OMB. That is actually a myth that OMB has to —did OMB have to look at your testimony before you spoke?

Mr. BACHULA. Yes. They clear our testimony.

Senator ROCKEFELLER. You know, Chairman Frist, this happens in both administrations, and it is one of the reasons I am glad I

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am working where I am and not where you are, because it seems to me that you ought to be, either through subliminal ways or frowns on your forehead or something else, you ought to be passing signals up here saying, if some of you guys would get behind this thing and make more noise about it, we want desperately to do this.

Instead, the impression that comes across is, it is the careful analysis of something which barely exists. It gives the impression you want to get rid of it, which we have been told directly. That is, my office.

So to the extent that you can step out of the box and say what you think that EPSCoT potentially could mean, if we were to do it in the right way.

Mr. BACHULA. Senator, there is a trend worldwide right now to look at technology-based economic development on a regional basis, a local basis, and there is a lot of activity going on. In some of the larger States like Pennsylvania, Governor Ridge just announced a major Tech 21 initiative. The Governor of Illinois and the mayor of Chicago both announced very major initiatives, and it is not limited to the United States. If you go to Northern Ireland or Tel Aviv or Bangalore, you see very significant efforts to transform economic development into an innovation-based, knowledge-based strategy.

EPSCoT is a program that is designed precisely to do that in the States and the regions of the country that need it the most. I participated very intimately in the design of the program. I was out in workshops in Montana and down in New Orleans. I am a strong advocate of this program, and nowhere within the Technology Administration will there ever be a recommendation to end it.

Senator ROCKEFELLER. Now, that is more like it. [Laughter.]

But that is important to say. I mean, you were out in Montana. Maybe that had something to do with Senator Conrad Burns, who is one of the people who really wanted to get this going, and so that speaks of bipartisanship.

I remember the years that we were going through all the problems with ATP, the so-called winners and losers matter. One year we had to get rid of $10 million for commercialization as an item in whatever trillion-dollar budget was going on that year, but nobody stopped pumping for it because everybody knew it was right. Now there is still some controversy, I am sure, associated with it.

For the most part the committee understands it is tremendously important to do EPSCoT in that it aims itself more at States that are not as prominent, or universities, or efforts, or businesses that are not as prominent—I mean, you cannot do a Sematech out of EPSCoT, but there are enormous numbers of things that can be done.

So I guess, Chairman Frist, one of the things we need to do up here is to make it much more clear that the Congress cares a great deal about this program, and that because it is 1-year old it does not mean its time has passed.

Thank you, sir.

Senator FRIST. Thank you, Senator Rockefeller.

I and others will have several questions to submit in writing.

Let me ask two final questions. Mr. Kammer, you announced several low rates for fasteners with only 1 percent of all recalls in

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the automobile industry involved fastener quality. Can you compare the noncompliance rate for this industry to other industries and to rates prior to passage of the Fastener Quality Act in 1990?

Mr. KAMMER. I can compare prior to the Fastener Quality Act. I do have data for that, and for the other I can provide it for you. I simply do not know that much about the other industries, but we had examples in the Department of Defense inventories of fasteners where they were 50 percent noncompliant.

The same was true in DOE and in NASA, where they had this enormously high 30 to 60 percent kinds of noncompliance rates, primarily because of mislabeled fasteners, it was interesting, we finally discovered traceable to a relatively few companies that were large providers of the mislabeled fasteners, some I am sure offshore.

Now, as you said, 1 percent. I think of all the recalls in the automobile industry in the last 10 years, or since 1990. 20 have involved fasteners, and none of those involved fatalities or serious injuries. This is an issue that has changed very dramatically from where it once was, and for the good.

Senator FRIST. Thank you. I think we need to move to our second panel. Thank you both, and again, we will be submitting several questions. I mentioned the written testimony from several other fastener companies will be made available. I thank both of you very much for your testimony, and the discussion period.

Now I will ask the second panel to come forward. We have three panelists who will be addressing us this afternoon, Mr. Robert Brunner, vice president, Illinois Tool Works Shakeproof, Mr. Adrian Cockman, senior standards engineer from Ford Motor Company, and Mr. Steven Schonholtz, president of Gardenbolt International, Incorporated. We appreciate all three of you being with us this afternoon. We will begin with Mr. Brunner.

STATEMENT OF ROBERT E. BRUNNER, VICE PRESIDENT, ITW SHAKEPROOF, INC.

Mr. BRUNNER. Mr. Chairman and members of the subcommittee, on behalf of the Industrial Fasteners Institute I wish to thank you for the opportunity to appear today before the committee. My name is Robert Brunner and I am vice president and general manager of several divisions of Illinois Tool Works, Incorporated. I also serve as chairman of the Automotive Division of the Industrial Fasteners Institute. The IFI is a trade association comprised of some 148 companies that manufacture over 85 percent of all domestically produced metal fasteners throughout North America and their suppliers of raw materials, machinery, tooling, installation equipment, and engineering services.

The member companies of the Industrial Fasteners Institute strongly support the amendments to the FQA embodied in the two recently introduced bills, S. 795 and H.R. 1183, and urge their swift passage by the Congress.

As I am sure you know, Congress must act before June 24, 1999 or the existing law will be implemented, with severe negative impacts to fastener manufacturers, distributors, and their customers.

The IFI has been deeply involved in the long struggle to implement a workable Fastener Quality Act. Going back to the mid-

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1980's, the IFI, along with distributors, importers, and end users of fasteners, worked tirelessly with the Congress and various agencies of Government to develop fasteners legislation that provided for the protection of public safety.

In the ensuing years, many positive changes in both the manufacturing and procurement of fasteners have taken place, which now provide for even greater protection and public safety, than could have been achieved under the original FQA.

These changes are documented in the U.S. Department of Commerce report required by this subcommittee and Congress last year with the passage of public law 105–234. The report was delivered to Congress on February 24, 1999 and is entitled, the Fastener Quality Act Assessment and Recommendations.

Mr. Chairman, we commend you and this subcommittee for your foresight in seeking a thorough review of the circumstances surrounding the enactment of the original Fastener Quality Act as well as the status of today's fastener industry. We also commend the Commerce Department on its efforts to fully examine the subject, and we agree with their conclusion that there is virtually no evidence of any problem with fasteners in today's economy, and therefore little reason to support the implementation of the existing FQA.

However, we do recognize that the potential will always exist for unscrupulous persons to intentionally misrepresent fasteners. Accordingly, we agree that Congress should create an effective deterrent to potential future fastener fraud by refocusing the FQA on the prevention and prosecution of those who attempt to intentionally mismark or misrepresent fasteners.

The IFI believes that the bill presently under consideration before this subcommittee, S. 795, outlines a simplified, common sense approach that continues to assure public safety while avoiding the imposition of burdensome, costly, duplicative, and counterproductive compliance requirements that fail to recognize evolving fastener quality systems and business practices.

It accomplishes this in several ways. S. 795 focuses the scope of coverage on high strength grade marked fasteners which are used in applications where public safety might be compromised. S. 795 recognizes the benefits of advanced quality assurance systems, and implicitly encourages all producers to invest in the adoption of such systems.

S. 795 creates accountability by requiring fastener producers to imprint a registered insignia on their product.

S. 795 provides traceability by requiring fastener manufacturers to retain documents and/or records generated during the manufacture and inspection of each lot of fasteners for 5 years.

S. 795 directs the Department of Commerce to create a mechanism to facilitate the reporting and investigation of suspected cases of intentional misrepresentation and S. 795 defines and establishes punishments for the intentional misrepresentation of fasteners.

Let me emphasize again the importance of passing S. 795 quickly. In the opinion of the IFI, there are not enough laboratories to or tl necessary tests required under the existing law both in geography and in terms of scope of accreditation. As a

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result, unless S. 795 is enacted by June 24, we will likely face production interruptions in our very basic industries.

In testimony offered to the House Subcommittee on Technology last February, Mr. John O'Brien stated on behalf of the IFI that "we do not sit in your chairs. We do not bear the responsibility of representing the families in your States who deserve to know that their Government cares about them and their well-being."

The enactment of S. 795, in my opinion, will allow you to go back to your States and tell those families that you have provided protection from fraudulent fasteners now and in the future. Moreover, you will be able to tell your constituents that they will not have to pay a premium for that extra measure of safety. The cost of their cars, their houses, their refrigerators, their coffee makers and air fares will not rise because of this legislation.

Finally, you will be able to tell the tens of thousands of fastener industry workers whose jobs depend upon their company's ability to remain competitive that you have passed a law that will not place their jobs in jeopardy.

Mr. Chairman, the IFI and its members pledge their full support of S. 795, and thank you for your foresight in addressing this very important issue. I would be happy to respond to any questions .

[The prepared statement of Mr. Brunner follows:]

PREPARED STATEMENT OF ROBERT E. BRUNNER, VICE PRESIDENT, ITW SHAKEPROOF, INC.

Mr. Chairman and Members of the Subcommittee; on behalf of the Industrial Fasteners Institute (IFI), I wish to thank you for the opportunity to appear before you today. My name is Robert Brunner, and I am Vice President and General Manager of several Divisions of Illinois Tool Works, Inc. I also serve as Chairman of the Automotive Division of the Industrial Fasteners Institute (IFI). The IFI is a trade association comprised of 148 companies that manufacture over 85% of all domestically produced metal fasteners throughout North America, and their suppliers of raw materials, machinery, tooling, installation equipment, and engineering services. The member companies of the Industrial Fasteners Institute strongly support the amendments to the FQA embodied in the two recently introduced bills (S.795 and H.R. 1183) and urge their swift passage by the Congress.

The IFI has been deeply involved in the long struggle to implement a workable Fastener Quality Act. Going back to the mid nineteen eighties, the IFI along with distributors, importers, and end-users of fasteners, worked tirelessly with the Congress and various agencies of Government to develop fastener legislation that provided for the protection of public safety. In the ensuing years, many positive changes in both the manufacturing and procurement of fasteners have taken place which now provide for even greater protection of public safety than could have been achieved under the original FQA.

These changes are documented in the U. S. Department of Commerce report required by this subcommittee and Congress last year with the passage of Public Law 105-234. The report was delivered to Congress on February 24, 1999, and is entitled *The Fastener Quality Act: Assessment and Recommendations.*

Mr. Chairman, we commend you and this subcommittee for your foresight in seeking a thorough review of the circumstances surrounding the enactment of the original Fastener Quality Act, as well as the status of today's fastener industry. We also commend the Commerce Department on its efforts to fully examine the subject and we agree with their conclusion that there is virtually no evidence of any problem with fasteners in today's economy, and, therefore, little reason to support the implementation of the existing FQA. However, we do recognize that the potential will always exist for unscrupulous persons to intentionally misrepresent fasteners. Accordingly, we agree that Congress should create an effective deterrent to potential future fastener fraud by refocusing the FQA on the prevention and prosecution of those who attempt to intentionally mismark or misrepresent fasteners.Mr. Chairman, the IFf believes that S.795 outlines a simplified common sense approach that continues to assure public safety while avoiding the imposition of burdensome, costly, duplicative, and counter-productive compliance requirements that fail to recognize evolving

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fastener quality systems and business practices. It accomplishes this in several ways.

1. S. 795 focuses the scope of coverage on high strength grade-marked fasteners, which are used in applications where public safety might be compromised.
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3. S. 795 creates accountability by requiring fastener producers to imprint a registered insignia on their product.
4. S. 795 provides traceability by requiring fastener manufacturers to retain documents and/or records generated during the manufacture and inspection of each lot of fasteners for five years.
5. S. 795 directs the Department of Commerce to create a mechanism to facilitate the reporting and investigation of suspected cases of intentional misrepresentation.
6. S. 795 defines and establishes punishments for the intentional misrepresentation of fasteners.

In testimony offered to the House Subcommittee on Technology last February, Mr. John O'Brien stated on behalf of the IFI that; "we do not sit in your chairs. We do not bear the responsibility of representing the families in your districts who deserve to know that their government cares about them and their wellbeing." The enactment of S. 795 in my opinion, will allow you to go back to your districts and tell those families that they will be safe from fraudulent fasteners now, and in the future. Moreover, you will be able to tell your constituents that they won't have to pay a premium for that extra measure of safety. The costs of their cars, houses, refrigerators, coffee makers, and airfares will not rise because of this legislation. Finally, you will be able to tell the tens of thousands of fastener industry workers whose jobs depend upon their company's ability to remain competitive, that you have passed a law that will not place their jobs in jeopardy.

Mr. Chairman, the IFI and its members pledge their full support of S. 795 and thank you for your foresight in addressing this very important issue. I would be happy to respond to any questions.

Senator FRIST. Thank you, Mr. Brunner.

Mr. Cockman.

STATEMENT OF ADRIAN COCKMAN, SENIOR STANDARDS ENGINEER, ENGINEERING STANDARDS AND SYSTEMS ENGINEERING DEPARTMENT, FORD MOTOR COMPANY

Mr. COCKMAN. Thank you, Mr. Chairman. Adrian Cockman, senior standards engineer for Ford Motor Company. I am speaking today on behalf of Ford, the Alliance of Automobile Manufacturers, and the Association of International Automobile Manufacturers. These organizations represent every major producer and importer of automobiles and light trucks in the U.S. market.

Motor vehicle manufacturers have strong incentives to ensure that all of the fasteners they use meet or exceed demanding standards for quality. The continuous need to increase customer satisfaction and safety long ago attuned motor vehicle manufacturers to the importance of quality. These factors have led to the implementation of extensive quality assurance programs to ensure that only high quality safe fasteners are used in our products.

My principal responsibility at Ford is the management of the corporate worldwide fastener standards system. This system controls all fasteners used by Ford Motor Company worldwide. Several departments within Ford work together to develop state-of-the-art standards in harmony with Ford's overall quality system, which is QS 9000. This cooperative effort ensures that the high standards required by Ford are continuously met.

Ford's requirements are not unique. Similar company standards and quality systems are used throughout the automotive industry. To [illegible]nated as a quality supplier, a supplier must not only

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supply parts that meet the standards, but they must be able to demonstrate continuous improvement and a reduction in variation on waste. They must react to immediate changes, be proactive, and supply the correct quantity of parts, correctly packaged and on time.

Automotive companies continually monitor quality in data bases that are accessible to our suppliers. Any supplier unable continuously to meet these requirements will be removed from the automotive supply base.

The current Fastener Quality Act requires fastener suppliers to add redundant and expensive end-of-line testing by accredited laboratories. As the Commerce Department report noted, this obsolete end-of-line testing approach results in a far lower level of quality compared to the current quality assurance systems.

In addition, the test report, certification, lot control, and lot traceability requirements are inefficient, they do not recognize modern paperless recordkeeping, and add substantial costs to manufacturers and consumers without corresponding safety benefits. The current Fastener Quality Act also places an unnecessary financial and logistical burden on low volume service parts.

In addition to the automotive advanced quality assurance systems, the safety of critical fasteners is promoted by provisions of the Federal motor vehicle safety laws, the Safety Act. Fasteners used in applications covered by Federal motor vehicle safety standards are designed and produced to high levels of quality to permit a motor vehicle manufacturer to certify that every vehicle they produce complies with the safety standards. In addition, the Safety Act requires that any vehicle which contains a defect that creates an unreasonable risk to safety must be recalled and remedied.

Experience demonstrates how effective the motor vehicle industry's efforts to ensure fastener quality have been. An analysis for the National Highway Traffic Safety Administration of their safety recall data base revealed that in the 1994 to 1998 period, only 13 out of 1,464 recalls may have involved fastener quality. All 13 recalls were initiated voluntarily by the manufacturers, and based upon a review of these 13, even had the Fastener Quality Act been in effect, the need for these recalls would not have been eliminated.

An earlier review of the safety recall files by the Association of International Automobile Manufacturers revealed a similar experience. Of 2,600 recalls that occurred in a 10-year period ending in 1995, only 5 recalls may have involved fasteners subject to the Fastener Quality Act. For this period of time, approximately 325 billion fasteners were used on motor vehicles.

The evidence clearly shows that the automotive industry does not have any fastener quality problems. However, the automotive industry supports the recently introduced Senate and House bills. These bills will provide commercial and Government customers with a greater assurance that fasteners meet stated specifications. The bills also recognize the actions that major end users take in developing fastener standards and quality systems to ensure that only high quality fasteners are used in their products.

I have submitted a more comprehensive written statement, and request that it be included in the hearing record. On behalf of the

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automotive industry, thank you again for the opportunity to provide views on the Fastener Quality Act. I welcome any questions.

[The prepared statement of Mr. Cockman follows:]

PREPARED STATEMENT OF ADRIAN COCKMAN, SENIOR STANDARDS ENGINEER, ENGINEERING STANDARDS AND SYSTEMS ENGINEERING DEPARTMENT, FORD MOTOR COMPANY

INTRODUCTION

Good afternoon, I am Adrian Cockman, Senior Standards Engineer, of Ford Motor Company. I am speaking today on the behalf of Ford, the Alliance of Automobile Manufacturers (the Alliance) and the Association of International Automobile Manufacturers (AIAM). Together the Alliance and AIAM represent every major producer and importer of automobiles and light trucks in the U.S. market.

I appreciate the opportunity to appear before you today to urge you to amend the Fastener Quality Act (FQA). The automotive industry supports the principles embodied in the Commerce Department's recent report to Congress on fastener quality. We also support the two recently introduced bills, S. 795 and H.R. 1183, which would amend the Fastener Quality Act. We urge the earliest possible enactment of legislation consistent with these bills, particularly in view of the June 24, 1999, effective date of regulations based on the current Fastener Quality Act.

THE AUTO INDUSTRY'S FOCUS ON FASTENER QUALITY

Motor vehicle manufacturers have strong competitive incentives to ensure that all of the fasteners they use meet or exceed demanding standards for quality. The continuous need to increase customer safety and satisfaction long ago attuned motor vehicle manufacturers to the importance of quality. These factors have led to the implementation of extensive quality assurance programs to ensure that only high quality, safe components including fasteners are used in our products. These programs ensure much higher levels of fastener quality than the methods imposed by the current Fastener Quality Act.

My principal responsibility at Ford is the management of the Corporate Worldwide Fastener Standards System. This system controls all fasteners used by Ford Motor Company and its associated companies worldwide. Input to the Ford fastener system comes from Design Engineers, Fastener Engineers, Supplier Technical Assistance, and the Purchasing and Customer Service Division. All of these departments work together to develop state of the art standards in harmony with Ford's overall quality system, QS9000. This cooperative effort ensures that the high standards required by Ford are continuously met. And Ford's requirements are not unique; similar company standards and quality systems are used throughout the automotive industry.

The ability of a manufacturer to produce fasteners that consistently meet or exceed these high standards is very important. However, it is only one aspect of what the automotive industry considers to be quality. To be a quality supplier to the automotive industry, Ford requires that a supplier must not only supply parts that meet the standards, but also be able to (i) demonstrate continuous improvement and a reduction in variation and waste, (ii) immediately react to changes in requirements, (iii) be proactive, and (iv) supply the correct quantity of parts, packaged correctly and on time. Suppliers who meet all of these requirements are designated as Quality Suppliers. Automotive companies continually monitor quality in databases accessible to the suppliers. Any supplier unable to meet all of these requirements is removed from the automotive supply base.

FEDERAL LEGISLATION AND REGULATION SHOULD ADDRESS REAL PROBLEMS IN AN EFFICIENT MANNER

The Fastener Quality Act should address identified and documented fastener problems, and apply effective and efficient strategies for dealing with those problems. The remedial strategies should be closely tailored to the problem areas identified. This approach is consistent with the findings and recommendations of the Commerce Department's report, which concluded that fastener quality is already adequately addressed in major industrial and government procurement sectors. This approach is also embodied in the recent Senate and House bills, S. 795 and H.R. 1183.

The automotive industry purchases fasteners from suppliers who use systematic, advanced, manufacturer-approved and monitored, quality assurance systems. In its current form, the Fastener Quality Act would require our fastener suppliers to add

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redundant and expensive end-of-line testing of samples from discrete fastener lots by accredited, independent laboratories. As the Commerce Department report noted, this obsolete "end-of-line" testing approach resulted in the past in a far lower level of quality compared to current quality assurance systems. In addition, the test report, certification, lot control, and lot traceability requirements detailed in the current Fastener Quality Act are inefficient, do not recognize modern, paperless record keeping, and add substantial costs to manufacturers and consumers without corresponding safety benefits.

The current Fastener Quality Act also places an unnecessary financial and logistical burden on service or replacement part purchasing and distribution. Service parts are generally low volume components, especially when compared to the quantities of the identical components purchased by the manufacturer for vehicle production. For small volume service fasteners, the cost resulting from this law could be more than $100 per fastener, and will result in some service fasteners not being supplied at all. The unavailability of quality service fasteners could cause customers to use a fastener that fits, but does not meet strength or special feature requirements. This will result in a reduction in safety.

THE SAFETY OF CRITICAL USE FASTENERS IN MOTOR VEHICLES IS ALSO PROMOTED BY PROVISIONS OF THE FEDERAL MOTOR VEHICLE SAFETY LAWS

In addition to promoting fastener quality through advanced quality assurance systems, the safety of critical fasteners used in motor vehicle applications is promoted by provisions of the Federal motor vehicle safety laws (the "Safety Act"). Fasteners used in applications covered by Federal Motor Vehicle Safety Standards issued by the National Highway Traffic Safety Administration (NHTSA) are designed and produced to consistently high levels of quality to permit a motor vehicle manufacturer to certify that *every* vehicle produced complies with the safety standards. This would include fasteners for safety belt anchorages, fuel tank mounting, steering column energy absorption systems, seat anchorages and brake system mounting. In addition, the Safety Act requires that any vehicles that contain a defect in performance, construction, any component, or material that creates an unreasonable risk to safety must be recalled and remedied.

Actual experience demonstrates how effective the motor vehicle industry's efforts to ensure fastener quality have been. An analysis of the NHTSA safety recall database by NHTSA itself, as reported to the Fastener Quality Workshop conducted by the American Society of Mechanical Engineers in November 1998, revealed that, in the 1994 to 1998 period, only 13 recalls involving only ½ million vehicles out of 1,464 recalls involving 79 million vehicles may have involved fastener quality. Moreover, all 13 recalls were initiated voluntarily by the manufacturers, without the necessity of a NHTSA defect or noncompliance investigation. No injuries were involved. Finally, based upon a review of the recalls, even had the current Fastener Quality Act been in effect, the need for these recalls would not have been eliminated, since the recalls either did not involve fastener quality or would not have been detected with "end-of-line" tests. Given that each of the 15 million vehicles sold each year in the U.S. contain between 2,000 and 3,000 fasteners, this represents a maximum of only 13 recalls for the *150 to 225 billion* fasteners used on motor vehicles over a five-year span.

An earlier review of the NHTSA recall files by AIAM revealed a similar experience. Of the 2,600 total recalls of vehicles and motor vehicle equipment that occurred during the ten-year period from 1986 through 1995, only five recalls may have involved fastener quality issues that might have been affected by to the Fastener Quality Act. For this period of time, *300 to 350 billion* fasteners were used on motor vehicles.

THE AUTOMOTIVE INDUSTRY URGES PROMPT PASSAGE OF LEGISLATION AND REGULATIONS THAT ADDRESS REAL FASTENER PROBLEMS.

The evidence shows that the automotive industry does not have any fastener quality problems. However, the automotive industry supports legislation that would address safety risks from fraudulent misrepresentations of fasteners.

The automotive industry supports the recently introduced Senate and House bills as being consistent with these concepts. These bills target safety-critical fasteners and are directed at deterring the introduction of nonconforming fasteners into commerce and to providing commercial and government customers with greater assurance that fasteners meet stated specifications by prohibiting the fraudulent dissemination of nonconforming fasteners within the United States. The bills also recognize the actions that major end users take in developing fastener standards and quality systems to ensure that only high quality fasteners are used in their products.

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Thank you again for the opportunity to provide views on the Fastener Quality Act. I would be pleased to answer any questions you may have.

Senator FRIST. Thank you, Mr. Cockman.

Mr. Schonholtz.

STATEMENT OF STEVEN SCHONHOLTZ, PRESIDENT, GARDENBOLT INTERNATIONAL, INC.

Mr. SCHONHOLTZ. Chairman Frist and Senator Breaux, thank you for this opportunity to testify at this important hearing. My name is Steven Schonholtz, and I am currently president of Gardenbolt International Inc. of Sayreville, New Jersey, and as of this May 1 I will be president of Heads and Threads International.

Gardenbolt has merged with Heads and Threads of Northbrook, Illinois to create one of the largest companies in the United States specializing in the importation and master distribution of commercial fasteners. I am here today as a concerned fastener business executive and as the representative of the National Fastener Distributors Association, NFDA, in support of S. 795, The Fastener Quality Act Amendments Act of 1999.

We very much appreciate the efforts of Senator McCain in introducing this important piece of legislation and Senator Burns, Senator Hollings, and you, Senator Breaux, in cosponsoring the bill.

The NFDA is the national trade association that represents some 250 individual companies, and in addition to the NFDA membership the association is secretary to the Fastener Industry Coalition that represents fastener associations throughout the United States, whose membership includes nearly 2,500 distributors, importers, and manufacturers of fasteners. Most of these companies are small businesses.

A great majority of the $9 billion fastener commerce in this country is conducted by members of NFDA or the Fastener Industry Coalition. The NFDA strongly supports S. 795, incorporating much-needed major revisions to the Fastener Quality Act of 1990. In his introduction of S. 795, Senator McCain correctly noted that if this bill is not implemented by June 24 of this year the Secretary of Commerce will have no other choice but to implement the act as originally passed in 1990. If that happens, several of the Nation's key industries may be brought to a halt due to a lack of certified fasteners, and the impact of such a slow-down would be disastrous both economically and in terms of continuous flow of products and services to maintain our current way of life.

The Commerce Department and the National Institute of Standards and Technology have worked diligently over the past 8 years to resolve problems with the FQA, first by amending the act in 1996, and by subsequently issuing implementing regulations in September 1996 and again in April 1998. I was an original member of the Fastener Industry Advisory Committee chartered in 1991 under the FQA to advise NIST and the Commerce Department on the implementation of the act.

For more than 6 years that the advisory committee was in existence, NIST and the Department listened to industry about prob-
as th the act, and attempted, within limits imposed by law, to
m: ıt workable and cost-effective. For its part, the industry has
many millions of dollars over the past 8 years to prepare for

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the law. Dozens of FQA workshops have been held across the United States as well as numerous workshops in Taiwan and Europe, many of which I participated in. They have been attended by more than 4,000 industry officials.

It is safe to say the world of fasteners in 1989 when the original problems in our industry surfaced does not resemble the world of fasteners in 1999. Tremendous progress has been made over the last 10 years in all facets of manufacturing, distribution, and end user procurement practices of fasteners. Much of the progress that has been forged comes from the mutual cooperation of these groups working in a unified manner throughout their organizations to better the quality of our products as they enter commerce.

There is a stricter adherence to published standards and specifications. Development and recognition of quality assurance systems has been established in both domestic and foreign manufacturing sectors, the use and registration of manufacturers' identification symbols for traceability is mandated on products requiring these markings. Through education and promotion, end users are now focusing on purchasing from those reliable vendors that understand that superior quality products are the most marketable.

Even with our advancement as an industry and the administration's efforts to fix the original FQA, we have a law that NFDA believes to be excessive, unworkable in its regulatory approach, and in need of a major overhaul. Congress also recognized this last year in passing P.L. 105–234, which among other things delayed implementation of the law while the Commerce Department conducted a congressionally mandated study to examine whether the act is still needed. The Commerce Department delivered its report to Congress on February 24, 1999, and the report supports industry's concerns and comments over the past 8 years.

The NFDA wishes to commend the efforts of Dr. James Hill of NIST, who managed the study, and who worked closely with industry to learn first-hand the many problems that exist with the current FQA. On the basis of the 5-month study, the Commerce Department concluded that there is virtually no evidence of any problem with fasteners in today's economy. The Department recommended to Congress, and as Mr. Kammer just indicated, that the current FQA be amended to restrict coverage to something close to the original intent of Congress, which was 1 percent of high strength fasteners used in critical applications, give credit to fastener manufacturers using advanced quality assurance systems by considering those fasteners compliant with the FQA—I see the light does on.

Senator FRIST. You are welcome to continue for a few minutes.

Mr. SCHONHOLTZ. Greatly simplify the paperwork and reporting requirements, and allow the use of electronic media in maintaining these records, specifically refocus the FQA to prevention of fraud and misrepresentation in public and private transactions, and to maintain the current FQA requirement that fastener manufacturers register their insignia with the Government to ensure traceability back to the manufacturer if a fastener fails in service.

NFDA is part of a recently formed industry coalition of associations representing fastener manufacturers, importers, distributors,

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and end users. Both Mr. Brunner and Mr. Cockman here today are also from companies that are part of this coalition.

The coalition has spent many hundreds of hours over the last several months reviewing the Commerce Department's FQA report and talking with congressional staff of this committee and the House Science Committee and staff in Congressman John Dingell's office, the original sponsor of the 1990 FQA. These discussions have led to the development and introduction of H.R. 1183 in the House and S. 795 in the Senate.

The NFDA believes that S. 795 and H.R. 1183 are a common sense approach to amending the current FQA in a way that is consistent with the findings of the Commerce report and which recognize both industry's needs and the interests of Congress in assuring the continued public safety of fasteners sold in the marketplace today.

The NFDA feels S. 795 and H.R. 1183 address all the objectives of the administration, the Congress and the industry. However, NFDA believes that there needs to be more specific and definitive language in S. 795 and H.R. 1183 allowing for current inventories to be sold as compliant with the law after the law takes effect.

This is a potential $1 billion issue if manufacturers, importers, and distributors are not able to sell their inventories at current market levels because of customer insistence on full compliance with the new paperwork requirements after implementation date of the law. The majority of this inventory has manufacturers' ID markings and supportive test reports on file. This is the same product being put forth in a marketplace where there is no evidence of fastener quality problems. This is an issue we hope we can work with the committee to resolve.

Mr. Chairman, all that remains is a quick and decisive passage of S. 795. This is a bill that assures public safety while avoiding the imposition of burdensome, costly, and duplicative record-keeping, testing and certification procedures.

It recognizes evolving quality management practices, and also properly defines the role of Government as one of deterring the introduction of substandard fasteners and of aggressively pursuing criminal sanctions against those who would falsify records or otherwise misrepresent and mislead others in the sale of fasteners.

Thank you, Mr. Chairman and committee members for your time and consideration. I am prepared to attempt to answer any questions.

[The prepared statement of Mr. Schonholtz follows:]

PREPARED STATEMENT OF STEVEN SCHONHOLTZ PRESIDENT GARDENBOLT INTERNATIONAL, INC.

Chairman Frist and other Members of the Subcommittee, thank you for this opportunity to testify at this important hearing. My name is Steven Schonholtz and I am currently president of Gardenbolt International Inc. located in Sayreville, New Jersey, and as of May 1st president of Heads and Threads International. Gardenbok has merged with Heads and Threads of Northbrook, Illinois to create one of the largest companies in the United States specializing in the importation and master distribution of commercial fasteners. I am here today as a concerned fastener business executive and as the representative of the National Fastener Distributors Association (NFDA) in support of S. 795, the Fastener Quality Act Amendments Act of 1999. We very much appreciate the efforts of Senator McCain in introducing this important legislation and those of you, Senator Burns, Senator Hollings, [illegible] in cosponsoring the bill.

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The NFDA is a national trade association representing some 250 individual companies (150 distributor and 100 manufacturer, supplier, master distributor, importer and service support companies). In addition to the NFDA membership, the association is secretariat to the Fastener Industry Coalition that represents fastener associations throughout the United States whose membership includes nearly 2,500 distributors, importers and manufacturers of fasteners. A great majority of the $9 billion-dollar fastener commerce in this country is conducted by members of NFDA or of the Fastener Industry Coalition.

The NFDA strongly supports S. 795, incorporating much needed major revisions to the original Fastener Quality Act of 1990. In his introduction of S. 795, Senator McCain correctly noted that if this bill is not implemented as law by June 24 of this year, the Secretary of Commerce will have no other choice but to implement the Act as originally passed in 1990. If that happens, several of the nation's key industries may be brought to a halt due to lack of certified fasteners, and the impact of such a slow down would be disastrous both economically and in terms of continuous flow of products and services to maintain our current way of life. The fastener industry contributes more than 45,000 jobs to the U.S. economy and is a significant stakeholder in this country's international competitiveness. More than 70% of the billions of fasteners used in the United States is sold to companies that manufacture products, and most of these products compete in world markets.

The Commerce Department and the National Institute of Standards and Technology (NIST) have worked diligently over the past eight years to resolve problems with the original Fastener Quality Act (FQA), first by amending the Act in 1996, and then by subsequently issuing implementing regulations in September 1996, and in April 1998. I was a member of the Fastener Advisory Committee chartered in 1991, under the FQA, to advise NIST and the Commerce Department on implementation of the Act. For the more than six years that the Advisory Committee was in existence, NIST and the Department listened to industry about problems with the Act and attempted, within the limits imposed by law, to make it workable and cost effective. Through no fault of the Department, implementation dates for the Act have come and gone on three occasions because there were not enough laboratories accredited to perform the required inspections under the Act. For its part, the industry has spent many millions of dollars over the past eight years to prepare for the FQA. Dozens of FQA Workshops have been held across the United States, as well as numerous workshops in Taiwan and Europe, many of which I have participated in, and have been attended by more than 4,000 industry officials.

It is safe to say that the world of fasteners in 1989, when the original problems in our industry surfaced, does not resemble the world of fasteners in 1999. Tremendous progress has been made over the last ten years in all facets of manufacturing, distribution and end user procurement practices of fasteners. Much of the progress that has been forged comes from the mutual cooperation of these groups working in a unified manner through their organizations to better the quality of our products as they enter commerce. There is a stricter adherence to published standards and specifications. Development and recognition of quality assurance systems has been established in both domestic and foreign manufacturing sectors. The use and registration of manufacturers' identification symbols for traceability is mandated on products requiring these markings. Through education and promotion, end users are now focusing on purchasing from those reliable vendors that understand that superior quality products are the most marketable. Even with our advancement as an industry, and the Administration's efforts to fix the original FQA, we have a law that NFDA believes to be excessive, unworkable in its regulatory approach, and in need of major overhaul.

Congress also recognized the need to take another look at the FQA last year in passing P.L. 105-234 which, among other things, delayed implementation of the Act while the Commerce Department conducted a Congressionally mandated study to examine whether the Act is still needed. The Commerce Department delivered its report to Congress on February 24, 1999, and the report supports industry's concerns and comments of the past eight years. The NFDA wishes to commend the efforts of Dr. James Hill of NIST who managed the study and who worked closely with industry to learn firsthand the many problems that exist with the current FQA. On the basis of the five-month study, the Commerce Department recommended to Congress that the current FQA be amended. Most notable of the findings and recommendations contained in the report are the following:

COMMERCE REPORT FINDINGS

- The current FQA is not justified by problems in commercial or general aviation. This is based upon Commerce's findings that while failure of a fastener

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on a commercial or general aircraft could cause serious problems, the evidence does not suggest a significant fastener quality issue currently exists.

- The U.S. Customs Service conducted spot checks of imported fasteners from 1991 through 1997 and found significantly reduced incidents of fastener problems than occurred in the 1980s.
- The Defense Industrial Supply Center (DISC) instituted major new procurement pactices in the 1980s. Over the past four years DISC has checked military inventories and found no evidence or widespread problems with substandard or mismarked fasteners.
- NASA has adopted a parts policy for fasteners for its ten Centers that include procurement from approved manufacturers, purchasing in single lots, requirement for test reports and certificates of conformance for all lots, and receipt inspection/tests.
- A statute providing explicit criminal liability and severe penalties for fraud in commercial transactions involving fasteners could serve as a significant deterrent to future occurrences of incidents like those described in the 1988 Congressional Report.
- Fastener manufacturing has changed drastically in the last decade based on the demand for quality by customers using fasteners in commercial products. The use of quality management systems in fastener manufacturing is a positive trend and would be encouraged by recognizing it in the Act and providing simpler compliance requirements for those manufacturers using such systems of sufficient rigor and consistency.

COMMERCE REPORT RECOMMENDATIONS

- Order to approach the original intent of Congress to cover "1% of high-strength fasteners used in critical applications", coverage under the Act should be limited to only high-strength fasteners.
- To encourage the use of quality management systems, fasteners manufactured in a facility registered by a NIST-approved registrar to a quality management system should be deemed FQA compliant.
- The reporting requirements for a covered fastener should be retained to be the laboratory test report and the certificate of conformance that identifies the fastener by description, lot number, and either the manufacturer or private label distributor. These should be allowed to be transmitted and stored electronically provided the electronic system provides reasonable means of authentication.
- Congress should enact an amendment to Title 18 of the United States Code specifically directed at fraud in public and private commercial transactions involving fasteners.
- Congress should review the issue of whether fasteners imported into the United States as part of subassemblies or assemblies should be covered under the Act.

The NFDA is part of an industry-wide FQA Reform Coalition assembled late last year to address needed changes in the Act. This Coalition consists of approximately 30 companies and associations, including the NFDA and the Industrial Fasteners Institute (IFI), representing manufacturers and distributors of fasteners as well as their major customers in the automotive, aerospace, heavy equipment and general industry. The Coalition has spent many hundreds of hours over the last several months reviewing the Commerce Department's FQA Report and talking with Congressional staff of this Committee, the House Science Committee, and staff from Congressman John Dingell's office, the original sponsor of the 1990 Fastener Quality Act. These discussions have led to the development and introduction of H.R. 1183 in the House and to S. 795 in the Senate. The NFDA believes that S. 795 and H.R. 1183 are a common sense approach to amending the current FQA in a way that is consistent with the findings of the Commerce Report and which recognize both industry's needs and the interest of Congress in assuring the continued public safety of fasteners sold in the marketplace. The NFDA feels S. 795 and H.R. 1183 address all of the objectives of the Administration (Commerce Report), the Congress (including oversight Committees and Congressman Dingell, the original sponsor of the FQA), and industry:

- Coverage is restricted to general purpose "high-strength" fasteners manufactured to consensus standards or specifications. Fasteners produced to proprietary standards are not covered because major end-users of such proprietary standards have other means of assuring the quality of fasteners they purchase.
- [illegible] to the use of modern quality assurance systems in manufacturing and those companies that use systems specifically recog-

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nized under S. 795 and H.R. 1183 are considered compliant and exempt from coverage.

• Emphasis is on preventing intentional misrepresentation or fraud in the sale of covered fasteners rather than upon requiring government mandated testing and certification. Serious criminal penalties are imposed on those who would intentionally misrepresent or falsify the characteristics of fasteners. Manufacturers of covered fasteners produced to consensus standards will have to confirm the strength characteristics of these fasteners by testing in accredited laboratories.

• Records of conformance for each lot of covered fasteners will have to be maintained by manufacturers and importers for a period of five years, and the use of electronic recordkeeping is permitted.

• Traceability of fasteners is assured because manufacturers' identification markings will have to be on the head of a fastener as required by consensus standards or specifications, and such insignia must be registered with the Commerce Department. This preserves the cornerstone of the original FQA—that of being able to trace the identity of the manufacturer if a fastener fails in service.

• All segments of the industry covered by S. 795 and H.R. 1183 are treated equally, as compared to the original FQA where importers and foreign manufacturers were substantially discriminated against by having to shoulder unequal paperwork burdens relative to fasteners produced abroad and imported for sale into the United States.

• All of the above objectives are accomplished with a minimum of government regulation and without the extensive regulations (more than 150 pages) that were part of the original FQA.

• However, the NFDA believes that there needs to be more specific and definitive language in S. 795 and H.R. 1183, allowing for current inventories to be sold as compliant with the law after the law takes effect. This is a potential $1 billion issue if manufacturers, importers, and distributors are not able to sell their inventories at current market levels because of customer insistence of compliant product after implementation date of the law. The majority of this inventory has manufacturers' identification markings and supportive test results on file. This is the same product being put forth in a marketplace where there is no evidence of fastener quality problems. In order to resolve this issue, the NFDA proposes that the section in S. 795 and in H.R. 1183 dealing with "Applicability" be amended to read as follows:

SEC. 11. APPLICABILITY

"The requirements of this Act shall be applicable only to fasteners fabricated 180 days after the enactment of the Fastener Quality Act Amendments Act of 1999. Fasteners manufactured prior to enactment of the Act may be sold as compliant with the Act provided, representations about such fasteners meet the requirements of Section 4 of the Act."

In summary, the NFDA strongly supports S. 795 and urges its immediate passage. It is a common sense approach that assures public safety while avoiding the imposition of burdensome, costly, duplicative and counter-productive recordkeeping, testing and certification procedures. It recognizes evolving quality management practices. It also properly defines the role of government as one of deterring the introduction of substandard fasteners and of aggressively pursuing criminal sanctions. against those who would falsify records or otherwise misrepresent or mislead others in the sale of fasteners. As stated earlier, Senator McCain correctly noted that if this bill is not implemented as law by June 24 of this year, the Secretary of Commerce will have no other choice but to implement the Act as originally passed in 1990. If that happens, several of the nation's key industries may be brought to a halt due to lack of certified fasteners, and the impact of such a slow down would be disastrous both economically and in terms of continuous flow of products and services to maintain our current way of life. This cannot be allowed to happen.

Thank you Mr. Chairman and Committee Members for your time and consideration. I am prepared to attempt to answer any questions you or the Committee may have for me.

Senator FRIST. Thank you. Thank all three of you for your testimony.

Mr. Brunner, which industries comprise most of the customers for the 1 percent of the fasteners that are still regulated by S. 795?

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Mr. BRUNNER. I am really only going to be able to speculate on that, but I would imagine they would be industries such as some of the defense sector industries, industries that I do not participate in, perhaps where they use consensus standard fasteners in some of the Department of Transportation areas as well. I would say the vast majority in my view would be probably Government sector type fastener purchases.

Senator FRIST. Do the other panelists have an answer to that?

Mr. SCHONHOLTZ. Some of that 1 percent will be from manufacturers domestically and foreign who are not able to get to the quality assurance system level. Therefore, their product would be covered by the act.

Senator FRIST. Would you expect them to incur additional cost as a result of the regulation?

Mr. SCHONHOLTZ. Those that are not currently under the system?

Senator FRIST. Yes, those manufacturers that are still regulated by S. 795.

Mr. SCHONHOLTZ. Yes, but the cost will be reduced under the new regulation based on a reduction in the paperwork.

Senator FRIST. Mr. Cockman, the automobile industry should be commended for its high safety standards. Do you have confidence that the nonautomotive industries are as dedicated to the high quality assurance programs that you have represented?

Mr. COCKMAN. Yes, many of them are. I cannot speak for all industries. Certainly the automotive, and mainly I would be talking there of the big three. Ford, GM, Chrysler initiated the QS 9000 quality system. However, that system has now spread through a lot more companies, principally automotive. The heavy truck industry is a large user of that system, and into the heavy equipment industry they are using similar quality systems, but those type of quality systems are used throughout the automotive industry.

Senator FRIST. Mr. Schonholtz, the original Fastener Quality Act was passed 9 years ago. Now, your company imported fasteners into the United States. What, in your opinion, has changed such that Congress may be assured that imported products will not be a problem if this law is implemented.

Mr. SCHONHOLTZ. There were problems 10 years ago. Certainly, a major change is the QS systems developed worldwide, not only in this country, and as an example, Taiwan is probably the largest exporting country of fasteners in the world. Of the 417 members of the Taiwan fastener Institute group, 98 have a QAS system, so that is big progress there.

Also, customs has been more involved and has focused on fasteners since the original legislation was presented, and there are customs checks and customs audits often, and there are seven testing labs around the country that are checking fasteners as they come into this country.

Senator FRIST. Thank you. Senator Breaux.

Senator BREAUX. Do we have enough labs to do all the testing?

Mr. BRUNNER. I would like to address that one. I do not believe we do, Senator. I believe one of the things that the Department of Commerce did was, they took and estimated that 450 labs are going to be required to allow for compliance under the old FQA.

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I think what they failed to do in coming up with that number is to determine the scope of accreditation required of those laboratories as well as the geographic location of those laboratories. You could have 10,000 laboratories accredited under the existing FQA, and if all 10,000 were accredited to do just Salt Spray testing there is no way compliance could begin under the FQA.

Senator BREAUX. How are the imported products tested? Mr. Schonholtz, you did a lot of importing. Where are they being tested, the foreign products?

Mr. SCHONHOLTZ. Many of the foreign factories have in-house laboratories, as do domestic factories, and they are being monitored through the QAS system that they subscribe to, or by accreditation systems that are in place.

Senator BREAUX. When users buy the products, can they distinguish between the imported product and the domestic manufactured product?

Mr. SCHONHOLTZ. That is an argument we have had for a long time. I would say no. If the product is manufactured to the standard and specification which they are supposed to be manufactured basically they are fungible items, except for the difference in the manufactures head marking.

Mr. BRUNNER. Senator, if I could address that, under S. 795 I think the answer to that clearly is yes, because it does require the recordation of insignia, so it will create an accountability trail for those fasteners covered under the act.

Senator BREAUX. I think that is important. Are the foreign products coming in spot-checked, I guess, or supposedly spot-checked?

Mr. SCHONHOLTZ. Yes.

Senator BREAUX. They are not going to check every fastener that comes in, obviously.

Mr. SCHONHOLTZ. They are sample tested, and I want to speak to what Mr. Brunner said. There has been registration going on over the last 9 years since the original bill was introduced with the Patent and Trademark Office of every factory that wants to manufacture under this law to register the head mark, and traceability is created.

Senator BREAUX. Thank you. Thank you, gentlemen.

Senator FRIST. In a brief followup to Senator Breaux's question, could you explain the inventory flow process for fasteners and why the 180-day allowance for implementation is the correct number?

Mr. SCHONHOLTZ. I do not know if 180 days is the correct number. That has been the time element we have had to work with since the original law. There is some concern, as I mentioned in my testimony, about when that implementation date should occur, that end users and users of fasteners will want product that complies completely with the Fastener Quality Act. There is a big concern.

It was a $1 billion figure we were using, but now that we have reduced the scope of the act, we are talking about a $100 million figure. It could be in jeopardy if end users say I do not want the "old product," I want the new product, and so we are very much concerned about how the final language is written to allow us to sell that product that was bought in good faith in an environment that does not have fastener quality problems.

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Senator FRIST. Again, a follow-up to the question, is the 2-year delay for implementing the accredited laboratory provision needed by industry because the laboratories are not being prepared?

Mr. BRUNNER. Yes, I believe it is the laboratory issue that really drives that period of time. There will be, I am sure, a rulemaking process followed by then passage of S. 795. The accreditation of laboratories, the process of laboratory accreditation in and of itself is a time-consuming process. First, there is a limited number of accreditation bodies like A2LA or NAVLAP, so if there are, say, 200 companies in a queue, you have got to wait until you get to the front of the queue, number 1, and then you get into the process itself and get your laboratory accredited.

There is a process that takes months at times for the final recommendation to be given at least under the current NIST system, and then for NIST to accept that and list you as an accredited laboratory under the act, and so we think that 2 years is a reasonable timeframe to allow for the necessary laboratory infrastructure to be put into place to support compliance under S. 795.

Senator FRIST. When we look at the 100, no more than 100 in a package, in terms of dividing exclusive coverage, what keeps manufacturers from just breaking up and putting them in smaller packages?

Mr. BRUNNER. Well, I can speak as a manufacturer, and knowing manufacturing the economics just are not there. It would be more costly to break down my bulk lots, and that is how I ship my product.

Typically fastener lots are in 40-pound quarter kegs that can be anywhere upwards of 10, 15, 20,000 pieces in a box, and to break them down into smaller quantities, quantities like 100, 200, even 1,000 pieces, the costs are just so high that there would be no benefit in attempting to break them down unless my customer wants it that way and is willing to pay for that.

Senator Frist: Thank you. There will be other questions submitted to the panel.

I want to thank each of you for providing testimony as we proceed ahead with the underlying bill, and I want to thank each of you for participating, including the first panel on the Technology Administration and the Fastener Quality Act. Our discussions are critically important to the oversight by the Commerce Committee, and I hope to continue this dialog in the future as we prepare to move legislation and to address the many needs of the manufacturing and high technology industries.

[Whereupon, at 3:25 p.m., the subcommittee adjourned.]

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APPENDIX

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BILL FRIST TO GARY BACHULA

Question 1. You mentioned the need for $2 million to operate the National Technical Information Service.

A. What are the long-term financial needs for the NTIS?

Combined with on-going efforts to reduce costs, a base appropriation of $2 million, subject to annual adjustment, will enable NTIS to operate in a sustaining manner for the foreseeable future. This amount will defray approximately one-third of the total amount spent annually to compile and maintain the NTIS Bibliographic Database and to scan new acquisitions into electronic image.

B. Have you developed a business plan for the organization?

NTIS developed a Strategic Overview in FY 1996 which focused on using new electronic technologies to improve services to its traditional customers; on developing new lines of business as an integrator of information systems for federal agencies; and on creating subscription products to ensure a stable revenue stream. A similar plan was developed in January 1998, but is currently being reassessed. A new strategic plan will be issued by mid-summer, 1999. In addition, the Acting Under Secretary for Technology commissioned a study from a private consultant which contained some useful recommendations, but called for much larger appropriations than are practical and would have re-established NTIS as a publisher in competition with the private sector.

C. Have you explored the option of requesting that each agency that NTIS archives contribute to the cost of providing this service?

The major producers of technical information are the Defense and Energy Departments and NASA. Each of these provides its material fully abstracted and ready for permanent preservation. That is, these agencies already provide material in a way that saves NTIS considerable administrative costs and helps assure the comprehensiveness of the overall collection. We do not believe they would be willing to pay additional costs, especially as they also maintain their own distribution systems. NTIS did charge other agencies a fee, but discontinued the practice some years ago as these agencies began to experience significant budget reductions in the government-wide effort to reduce deficits. At the time, the fee was considered to be an irritant that could adversely affect NTIS's efforts to acquire information products but without significantly adding to revenues. At that time, of course, NTIS' sales were such that it could afford to do this. Reinstitution of the fee now would probably affect the willingness of agencies to cooperate with NTIS.

D. What is the impact of the electronic media on revenue generation?

The advent of electronic media has created problems as well as opportunities. On the one hand, it allows agencies to bypass traditional dissemination methods for printed products and place materials directly on the Internet. This adversely affects the comprehensiveness of the Clearinghouse, causes lost sales, and forces NTIS to expend resources to harvest the material from the Internet. It means that users must search many Government websites to find what has been produced on a given topic with no assurance it will be preserved for any length of time. On the other hand, it has provided a basis for NTIS offer a wide range of sophisticated information services to other agencies via its Fedworld platform, to reduce handling costs by taking orders via the Web; to reduce space and inventory costs by maintaining new acquisitions in electronic format only; and by creating new electronic subscription products to replace paper sales and to provide a more predictable revenue stream.

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E. Has "privatization" been explored as an option for the future of NTIS?

On April 28, 1986 the Department of Commerce issued a Federal Register notice calling for public comment on privatizing NTIS. Public reaction was overwhelmingly negative. Users protested that the private sector would have no economic incentive to maintain a clearinghouse of scientific information when only a few products had genuine commercial potential and that federal agencies would be unlikely to cooperate with a private sector entity. The passage of more than a decade has, in our view, failed to produce credible responses to these objections. Public comments have been aggregated in book form and are a part of NTIS' permanent collection (PBS 211 240).

Question 2. The Technology Administration Act of 1998 also authorized the creation of the Experimental Program to Stimulate Competitive Technology (EPSCoT). (A) How is the program coordinating with Experimental Program to Stimulate Competitive Research (EPSCoR)? (B) Are there any partnerships between states? (C) What is the FY 2000 funding level and justification for the program?

(A) Coordination with EPSCoR is an integral element of EPSCoT. EPSCoT grant proposals are evaluated in part on the degree to which the applicants demonstrate that the proposed activity builds on or is complementary to the stated goals of the state's EPSCoR strategic plan. Perhaps more significantly, five of the seven 1998 EPSCoT awards were made to coalitions in which the state EPSCoR committee is a full partner.

In Maine, the University of Maine at Orono is working closely with the Eastern Maine Development Council, the state's Manufacturing Extension program and the Maine Science & Technology Foundation to develop an information technology platform that will be available to the state's small businesses. The lead applicant is the Eastern Maine Development Corporation. In Alabama, the Alabama EPSCoR team is engaged in a project that will (for the first time) track and analyze private-sector investments in R&D. This effort involves the Alabama Department of Economic & Community Affairs (lead applicant), the Alabama Technology Network (MEP center) and the state's research universities. Because of this collaboration, the participants have realized that more than one organization had planned to survey the state's high-technology businesses. They now plan to pool their efforts, resulting in a more comprehensive survey and reducing the reporting burden on the state's businesses.

In Idaho, the Small Business Development Center at Boise State University is being funded to link and cross-train a number of service providers in the state. The effect of this activity will be greater impact of existing Federal and state services to high technology businesses and more cohesive service provision. The project brings together the Idaho EPSCoR Committee, Moscow Technology Business Incubator, Idaho Innovation Center, University of Idaho Research Park, TechHelp (ID Manufacturing Assistance Center), and the Idaho Department of Commerce.

In Puerto Rico, the lead applicant is the University of Puerto Rico-Rio Piedras, which has long been recognized for its training of top-notch science and engineering undergraduates and its performance of sponsored research. UPR is now working with the Governor's office, the Puerto Rico Chamber of Commerce, the Puerto Rico Manufacturers' association and the local SBA office to make its research assets broadly available to the private businesses on the island and facilitate their commercialization. In Mississippi, the University of Mississippi is the lead applicant, though it represents the Mississippi Research Consortium, which is made up of the research universities in the state. The MRC administers the state's EPSCoR program and has developed this project to leverage the efforts of EPSCoR. Whereas the EPSCoR efforts to increase competitiveness for SBIR and STTR grants focuses on university faculty, the EPSCoT project focuses on the small business community—increasing their awareness and providing technical assistance to prospective applicants.

Finally, in Louisiana, the Board of Regents, which is the governing body for the higher education system, is working in partnership with the Louisiana Department of Economic Development and the Louisiana Partnership for Technology & Innovation, to dramatically alter the environment for high-technology in the state. The grantees have already set up an Industrial Advisory Committee to identify and eliminate barriers to the commercialization of university technology. The Board of Regents will, for the first time, take into account the state's economic development priorities when making its research funding decisions. The remainder of the project involves commercializing several technologies and establishing public-private partnerships in each of the state's three regions to develop strategies for high-tech growth that are rooted in the expertise and resources of each region. This effort has the strong support of the Governor and the State Legislature.

(B) In the first grant round, EPSCoT funded one multi-state project. This project involves South Dakota, North Dakota, Montana and Wyoming. The lead applicant

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is the Small Business Development Center at Dakota State University in South Dakota. Ultimately, the applicants seek to knit together the business services available in the four states into a regional network that will accomplish on a regional basis what is not possible in each state individually. This award will allow the applicants to conduct a critical needs-assessment exercise, including an inventory of technology-based businesses in the four states. Conducting such an inventory will allow project participants to assess the needs of these businesses, help form local and regional networks, and more effectively target existing resources to the business community.

The other state partners are the Center for Innovation at the University of North Dakota, TechLink at Montana State University and the Wyoming Business Council.

(C) The requested funding level in Fiscal Year 2000 is $600,000. In keeping with the philosophy of the program, the Technology Administration intends to engage our grantees and other stakeholders in a dialogue about the structure and procedures of the program. The program was developed with significant stakeholder input as to the structure that would allow for the most effective implementation and we are committed to maintaining this dialogue. TA had certainly intended to conduct such a process in parallel with another grant competition, but due to administration-wide budget priorities, the grant competition will not be possible.

Question 3. What are you doing to ensure that the reports produced by your office are reaching the necessary government agencies and nongovernment organizations? Are the majority of federal agencies actively implementing recommendations contained in your analysis?

In answer to the first part of your question, we distribute our publications widely to industry and other federal and state agencies and generally make them available through our web site. This web site had more than 3 million hits in calendar year 1998 and more than 100,000 copies of our reports were downloaded from the site. In addition to our general list of recipients, we develop lists of parties interested in particular issues and attempt to alert them to our publications through mailings and through roll-out events staged with industry and professional groups. For example, our recent report on the environmental industry was previewed at a series of state-level meetings of environmental industry associations around the country and then formally introduced at an event sponsored by the Yale School of Forestry and Environmental Management, which featured a roundtable discussion of the report's recommendations by leading industry executives and nongovernmental organization officials. Numerous follow-up events have been generated by the initial publicity, including appearances at the Forbes Conference on the Environmental Industry and the annual meeting of the American Waste Management Association, an important association of environmental professionals.

First, let me note that not all of our reports contain recommendations for action. Some of our reports are intended solely to bring new factual information and insights to the policy-making community. For example, we have done a series of studies concerning the globalization of research and development, which provide new information concerning the geographic dispersion of research investments by U.S. and foreign companies. We have also produced studies of foreign governments' technology policies. Such reports are intended to increase understanding within the policy community of the technology-related aspects of government policy-making.

As to the second part of your question, the answer, of course, is that we have no power to compel any agency or private party to implement any recommendations we offer. Our goal is to be effective advocates for policies that encourage industrial competitiveness through the development and diffusion of new technologies. Ours is a unique policy perspective within the federal government but one which we think should be more broadly considered in the making of government policy. In some areas, such as technology transfer, we have been notably successful. Because of our close ties with industry, on one hand, and with the federal research agencies, on the other, we can help to shape technology transfer policies that serve industry's needs and are also crafted to be readily implemented by the agencies. Most recently, we have brought together industry views and agency concerns in the formulation of the Administration's position on technology transfer legislation considered by the 105th and 106th Congresses. We have also played a central role in the Administration's review of technology transfer procedures involving foreign parties, helping to find common ground between national military and economic security interests and the interests of the research and technology communities.

Question 4. Mr. Bachula, you mention in your testimony that the Technology Administration will focus its attention in fiscal year 2000 on the information technology work force. The President announced the IT2 Initiative earlier this year which will also concentrate on emerging work force issues as we enter the twenty-first century.

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(A) Why was the Technology Administration not included in this effort? Are you setting up duplicative programs that will also be conducted at the National Science Foundation?

The Technology Administration's role in the information technology (IT) work force challenge is acknowledged in the White House document describing the IT2 initiative, *Information Technology for the Twenty-First Century: A Bold Investment in America's Future.* On page 14, the document states that "Agencies such as the Department of Labor, the Department of Education and the Department of Commerce are working with industry, professional societies, and labor organizations to ensure that the United States has the best information technology workforce in the world."

We were not included in the IT2 budget because we did not submit a discrete budget initiative focused specifically on IT work force. We will, however, work to develop IT2 budget initiatives for FY 2001. We believe that the Technology Administration can and should make a valuable contribution to this cross cutting program not only in the area of the IT work force, but in some of the business and management issues that will be addressed in the examination of economic and social impacts of information technology. Our experience in private sector innovation and our relationships with the business community would bring an essential perspective to this part of the IT2 program.

We are not setting up programs duplicative of those conducted at the National Science Foundation. In the IT2 initiative, NSF is focusing largely on supporting software and high-end computing research, and research on human-computer interactions and information management. Of course, this research will help us develop our cadre of computer scientists. NSF also plans to make investments to upgrade cutting-edge computing resources—for example, a 5-teraflop capability—for the science and engineering community. The Technology Administration has no role in funding computer research or investing in scientific facilities.

Our efforts in the IT work force challenge have reflected the size of our budget—advocacy, analysis, and playing the role of catalyst to bring stakeholders together. For example, we spent the past year sponsoring and participating in town meetings around the country to better understand the challenges of ensuring the United States has the IT work force skills it needs to grow and compete. We are in the process of preparing a report of what we have learned. We also established the *Go4IT* web site, which is a database describing IT work force initiatives all around the country. Our focus is not on support of research to produce computer scientists, but rather in areas such as image of the profession, how industries and universities respond to each other's needs, the incumbent work force, and understanding business practices.

(B) Are your targeting women and minorities in your telecommuting and teletraining initiatives?

We believe telecommuting and teletraining hold promise across the board, for all parts of our work force. While women and minorities would benefit from expanded use, telecommuting's potential goes much farther, for example, allowing firms to tap skills regardless of geographic region, or making better use of our skills in rural communities. Teletraining can be particularly helpful for the incumbent work force who have to hold down jobs while improving their skills. Teletraining not only can deliver training at different times of the day and week, making it more accessible to those who work, it also can make a wider array of programs available, since learners would not necessarily have to participate in classroom instruction at some geographic location.With our ties to the business community, the Technology Administration is positioned to explore, for example, why employers are reluctant to adopt telecommuting programs, a significant barrier to the expansion of teleworking. We believe it would also be helpful to identify and disseminate models of telecommuting that work.

Question 5. Our speakers at an earlier hearing on Technology Transfer highlighted barriers to commercialization of innovations and suggested that commercialization efforts should be further recognized and rewarded. Should the federal government have commercialization policies as part of its efforts to maximize technology's contribution to economic growth?

I believe it is essential for the federal government to have commercialization poli- s in ı ; to litate the d pment and diffusion of new technologies and the ş] are two major elements to these commercializa- u policies. Fust, the ment has a unique role to play in encouraging the mercialization of tech s resulting from research that it funds. Second, the u essarily play role in creating a supportive climate for private sec- nd commercialization.

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1. *Commercialization of Federally-Funded Technologies*

First, with respect to the transfer and commercialization of federally funded inventions, we think there is an important role for the government to play. As you know, the agencies have authority to transfer technologies to the private sector for the purpose of commercialization. As a part of our responsibilities under the Stevenson-Wydler Technology Innovation Act, we are preparing a report on agency use of these authorities and recommendations for improving federal technology transfer. One of our tentative conclusions is that agencies need to make more complete use of the authorities already available for rewarding both inventors and others involved in successful technology transfers. To date, we have noted that laboratories generally do not license laboratory-generated intellectual property to their CRADA partners. We also have not identified many labs that seek to identify innovations having commercial potential and then to pursue ways to move them to the marketplace. Thus, tools that exist in the statute have yet to be effectively implemented.

On a more basic level, we also believe the agencies need to make a stronger commitment to the effective management of knowledge and other intellectual capital that exists at their laboratories. Whether it is in the form of protectable and licensable information generated under CRADAs, patentable inventions, or ideas expressed in journal articles or public presentations, they need to do a more complete job of evaluating the value and potential uses of this knowledge, including potential commercial applications. We look forward to sharing our report and its recommendations on these and other subjects with the committee.

Of course, there are still ways to improve the CRADA and invention licensing mechanisms with the objective of improving rates of commercialization, as reflected in the provisions of S. 804, currently before the committee, and H.R. 209, introduced by Congresswoman Morella. We thank the Committee for its efforts to secure passage of this legislation. We look forward to playing a central role in its implementation through the Interagency Working Group on Technology Transfer and through our responsibility for writing implementing regulations under the Bayh-Dole Act.

2. *Commercialization of Private Sector Innovations*

With respect to the commercialization of technologies originating from other sources, we think the government has a different role to play. The government is necessarily concerned with the health of the national innovation system because of its importance to our economy and our society. As a part of this, the government must be concerned with the creation of a public infrastructure to support innovation and commercialization. This infrastructure can include physical assets, such as modern telecommunications networks and university research facilities. It can also include intellectual assets, such as trained workers, well-educated engineers and scientists, university professors and competent business people. Certain aspects of this infrastructure are the job of state and local governments to create this infrastructure and the human and physical networks to tie the pieces together, the federal government can play a facilitating role in its development. Through programs such as EPSCoT, the federal government can help to develop new and effective approaches to the development of the human and physical networks needed to support commercialization of new technologies.

In addition, the government helps to set the "climate" for innovation and commercialization through its policy-making in such areas as regulation, taxation and economic policy. While the private sector is generally efficient in commercializing new technologies, that process is enhanced by predictable and coherent policy-making by the government. It is important that policy-makers understand the effect their decisions have on the innovation system and one of our objectives is to increase their understanding through some of the activities discussed in response to other questions.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. BILL FRIST TO RAYMOND G. KAMMER

Question 1. You mentioned in your statement that $1 million will be provided to American National Standards Institute (ANSI). How exactly will this money be used and how will it serve to increase U.S. exports?

Answer: The U.S. domestic standards system is comprised of many diverse and often fractious elements including: private sector standards bodies, federal regulations, industry standards, and state and local authorities. Unlike almost all other nations, the U.S. standards development system is primarily private and voluntary, with little direct financial support from the Federal Government. There are over 40,000 voluntary standards developed by the more than 600 U.S. Standards Developing Organizations (SDOs). This competitive system works well in the U.S. but

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presents a confusing set of faces to the international standards community. NIST is working with private-sector voluntary standards organizations to develop a national strategy for effectively promoting U.S. technology, measurements, and standards as the basis for intemational standards.

The American National Standards Institute (ANSI) is widely regarded as the "umbrella" organization of the diverse U.S. private sector SDOs. ANSI is the U.S. representative of the two major non-treaty international standards organizations, the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).

ANSI is currently experiencing financial difficulty due to the high costs of participating in these international organizations. The FY 2000 budget proposal will allow NIST to grant $1 million to ANSI, with the intent of increasing U.S. representation in the development of international standards. The effort will help U.S. standards to be introduced to the international arena in a more timely and efficient fashion.

Question 2. Can you update the Committee on the Teacher Science and Technology Enhancement Program? How will the money be spent in FY 2000?

Answer: NIST is actively working on developing a Teacher Science and Technology Enhancement Program (TSTEP). The first major activity is the development of a pilot program to partner schools and local technology-oriented industries to give teachers relevant summer experience in applied science and mathematics. NIST expects to make ten awards in FY 2000 to initiate the pilots.

NIST is considering other phases for TSTEP including:

- Providing selected K-12 teachers with summer internship experience at NIST laboratories working with scientists and engineers who are able to convey their excitement about science.
- Including applications related to commonly used, yet technologically advanced consumer products to introduce real-world applications that show the relevance of science in industrial competitiveness and quality.
- Developing supplementary class materials in both electronic and hard copy forms as a follow-up of the internship.

NIST is developing criteria to assess the effectiveness, progress, and success of this program and its possible components.

Question 3. Can you give us examples of the type of applications that require high strength fasteners and those that do not require high strength fasteners?

Answer: High strength fasteners and moderate strength fasteners are used in all industries, including aerospace, automotive, construction, and nuclear power. The particular design chosen by the design engineer to meet application requirements determines the required strength level of the fastener, based on such factors as the need for low weight (i.e., fewer fasteners, but higher strength), forces applied, room available for fasteners, and cost.

High strength fasteners are often used in such applications as bridge structures, automotive wheel studs, aircraft engine mounts, cellular telephone towers, and structures for steel frame buildings (especially high rise buildings). Fasteners used for general construction, home improvement projects, non-critical automotive applications, and many sports products (e.g., bicycles) are typically not high strength.

Question 4. How well is NIST working with the U.S. Fire Administration to set the fire research agenda for the nation? Are research priorities being properly identified?

Answer: The Fire Prevention and Control Act, enacted October 29, 1974, established a fire research center within the Department of Commerce at the National Institute of Standards and Technology (NIST). The mission of this center is to perform and support research on all aspects of fire with the aim of providing scientific and technical knowledge applicable to the prevention and control of unwanted fires. The Act further stipulates that the content and priorities of the research program shall be determined in consultation with the Administrator of the National Fire Prevention and Control Administration, now known as the United States Fire Administration (USFA). The USFA and NIST have a long standing partnership to meet the Nation's fire safety needs. In effect, NIST is the Nation's leading fire research laboratory and the focal point for fire research within the national government, while the USFA has overall responsibility for national fire safety policy and programs.

Recently, FEMA Director James Lee Witt commissioned a group of fire service leaders to conduct a Blue Ribbon Study of the United States Fire Administration. The Panel's recommendations are primarily focussed on the USFA and those research issues raised by the fire services. The Panel's report also discusses the critical role of NIST and others in meeting national fire safety goals and the urgency of developing a "national fire research agenda."

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About 18 months ago the U.S. Fire Administration conducted a Fire Research Agenda Meeting (FRAM) to address the needs and priorities of research for the fire service and the fire problem in general. The report of this meeting contains an extensive list of needs identified by the leaders in the fire community. On November 7, 1997, the USFA and NIST signed a Memorandum of Understanding to support and promote such cooperation to address these needs.

NIST's recent work on measurements for fire fighter protective clothing, software for advanced alarm panels, 3-D tracking of equipment and personnel, non-contact thermometry and other sensing in fire environments aid the safety and performance of fire fighters.

Examples of areas in which NIST has research efforts in collaboration with the USFA include the development of:

- The requirements for the number, type and location of home smoke alarms found in all U.S. (and most foreign) codes and standards and to many of the technological improvements found in modem smoke alarms.
- The development of quick response sprinklers. Nearly all buildings of six or more stories, most new commercial buildings, and many new multi-family residences routinely include these automatic sprinklers.
- Research which resulted in the understanding and quantification of the very rapid rate of onset of "flashover" (full room involvement) from a small household fire. This is now widely used in public service announcements, and fire safety training.

Question 5. Are any other Federal agencies beginning to apply the Malcolm Baldrige Award Criteria to their programs? Can you elaborate on the "Baldrige Index"?

Answer: NIST does not have official responsibility for monitoring Federal use of the Criteria or for working directly with Federal agencies. Therefore, NIST does not have systematic knowledge of Federal use of the Criteria. However, we do know that many agencies have obtained the Criteria and have heard that they are applying it to their programs.

The "Baldrige Index" is a fictitious stock fund made up of publicly traded U.S. companies that have received the Malcolm Baldrige National Quality Award during the years 1988 to 1997. NIST "invested" a hypothetical $1,000 in each of the Six whole company winners—ADAC Laboratories, Eastman Chemical Co., Federal Express Corp., Motorola Inc., and Solectron Corp. (a winner in 1991 and 1997). The investments were tracked from the first business day of the month following the announcement of award recipients through Dec. 1, 1998. Adjustments were made for stock splits. Another $1,000 was hypothetically invested in the S&P 500 for the same time period.

NIST found that the group of six whole company winners outperformed the S&P 500 by 2.6 to 1, achieving a 460 percent return on investment compared to a 175 percent return for the S&P 500.

NIST also tracked a similar hypothetical investment in a group made up of the six whole company winners and the parent companies of 17 subsidiary winners. The group of 23 outperformed the S&P 500 by about 2.5 to 1, achieving a 426 percent return on investment compared to a 173 percent return for the S&P 500.

Question 6. Recent legislation that has been introduced by members of this Committee have set the Advanced Encryption Standard as the national benchmark for computer security. How is NIST progressing on the development of secure algorithms? Are you concerned that the overwhelming majority of the respondents are international?

NIST's efforts to develop the Advanced Encryption Standard (AES) are proceeding on schedule. NIST publicly announced the initiation of this project in January 1997 with a call for public comments on draft evaluation criteria and submission requirements. In September 1997, NIST published the formal request for candidate algorithms, due to NIST in June 1998. In August 1998, at its First AES Candidate Conference, NIST announced the fifteen accepted candidate algorithms. Public comments were solicited for the "Round 1" analysis, completed April 15, 1999. NIST sponsored the Second AES Candidate Conference to discuss analysis to-date in March 1999. Later this summer, NIST intends to announce approximately five finalists and solicit public analysis for "Round 2," to be completed in the spring of 2000. Also in the spring of 2000, NIST will sponsor the Third AES Candidate Conference to listen to analysis and debate on the finalist algorithms. In the summer of 2000, we anticipate formal announcement of the proposed standard for public review, which will contain the algorithm(s) identified for inclusion in the AES. Following review and response to the public comments, a proposal will be made to the Secretary of Commerce for final approval of the AES Federal Information Processing Stand-

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ard. If all goes as planned, with the Secretary's approval, the AES should be completed by the summer of 2001.

The number of international respondents is not considered to be a problem. The specifications for each of the candidate algorithms have been made public and all are subject to intense public review and analysis by the world's cryptographic research community. However, from a US technology leadership perspective, it should be noted that three of the top contenders were submitted by US groups/fares.

Question 7. Can you explain the process used to determine the number of accreditation laboratories needed to implement the Fastener Quality Act? Does that number need to be reviewed?

NIST continues to base its estimate on the recommendation of the Fastener Advisory Committee (FAC), a fastener industry coalition. The FAC estimated that between 320 and 460 accredited laboratories would be needed to carry out the required testing under the Act and regulations. A range is given since these estimates are really an educated guess based on factors such as the number of fasteners estimated to be covered by the FQA, and the estimated average testing capacity of a typical lab. These estimates are based on the quite broad scope of coverage of the FQA.

As of 04/29/1999 there are 468 labs accredited to perform FQA work. Since it appears unlikely that the scope of the FQA will increase, a review of the required number of labs does not appear necessary.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. JOHN F. KERRY TO RAYMOND G. KAMMER

Question. Please explain how excluding the ATP from the SBIR set-aside complies with the law and how the Department of Commerce intends to make up the difference.

Answer. The SBIR is intended to redress the "disadvantaged" status of small R&D firms, yet small firms already lead 55 percent of all ATP awards. Small businesses also are involved in significant numbers in joint R&D ventures supported by the ATP, enabling them to form strategic partnerships with larger firms that would otherwise not have occurred in the SBIR program. By requiring participant cost-sharing, ATP actually increases the national level of R&D spending, while SBIR's lack of cost-sharing makes it more likely that these funds displace internal research spending. Unlike SBIR, ATP projects do not have to conform to an agency-specific mission. As the result of ATP's historical support for small R&D firms, the Administration has proposed the exemption of the ATP from the SBIR program. It is the Administration's belief that any decrease in the Department of Commerce's SBIR set-aside to small business would be more than made up with ATP-funded research going to small R&D firms.

April 22, 1999

The Honorable Bill Frist
Chairman
Senate Subcommittee on Science and Technology
U.S. Senate
Washington, DC 20510

Dear Chairman Frist: We are writing in regard to the recent hearing held by the Subcommittee on Science and Technology on the Fastener Quality Act. We appreciate the opportunity to have our comments included in the Subcommittee's hearing record.

GAMA thanks you for your work in the 105th Congress on this issue. Public Law 105-234 is very important legislation for the aviation industry. That legislation made clear that fasteners approved for use on an aircraft by the Federal Aviation Administration are not subject to the Fastener Quality Act. Your Subcommittee approved this legislation in part to avoid requiring aviation manufacturers from meeting duplicative and potentially confusing regulations. Your action was a critical step forward in reforming the FQA.

However, Public Law 105-234 did not address all problems with the FQA for aviation manufacturers because some fasteners used by our industry are subject to quality assurance systems other than the FAA's.

For instance, some fasteners used by our industry are subject to the quality assurance programs of foreign airworthiness authorities. These quality programs provide sufficient oversight of the quality of fasteners. These fasteners are in the same category as those approved by FAA except that they are approved by the equivalent

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foreign authority. Therefore, we recommend that language be added to the aircraft exemption to make clear that fasteners approved by a foreign airworthiness authority that is approved by 14 CFR Part 21 also be outside the FQA.

The remaining issues we will address relate to the standard fasteners that aviation manufacturers purchase from fastener manufacturers. These fasteners fall outside the FAA's quality assurance system and are currently subject to the FQA.

Covered Fasteners

GAMA urges the Subcommittee to make major modifications to the FQA. The report to the Subcommittee by the Department of Commerce concluded that the vast majority of incidents involving fasteners were not related to fastener quality. As a result, we believe the FQA could safely be narrowed to the original congressional intent that only 1% of high-strength fasteners used in critical applications be covered.

GAMA urges Congress to adopt the Department of Commerce recommendation that only grade-marked fasteners manufactured to a consensus or government standard be covered by the FQA. However, in doing so, it is important to clearly define grade identification marking. Grade-marking, which delineates strength of a fastener, should result in a covered fastener whereas part number marking, which is representative of configuration or identification, should not result in a covered fastener.

Allowance for Quality Management Systems

The Department of Commerce report clearly indicates that changes in manufacturing as well as end-user quality systems have virtually eliminated fastener quality problems. Given the current quality of fasteners, we see no reason for the Department's recommendation that quality systems be registered with NIST prior to deeming fasteners produced under quality systems FQA-compliant. We do not believe it is possible for NIST to develop a single specific definition for a quality management system.

Quality systems are developed to address specific industry or product requirements and vary greatly from one organization to another. Quality systems are influenced by customer and or end user requirements, standards/specifications, government oversight (FAA,DOD,NASA,etc.). If the Subcommittee chooses to define the parameters for quality management systems, they should be defined broadly so as not to restrict our manufacturers' flexibility to improve or adopt other quality systems.

Fraud

GAMA believes the objective of the FQA (to ensure public safety) can best be achieved by deterring fastener fraud and misrepresentation. We recommend that the Subcommittee amend the FQA to make it unlawful for a manufacturer or distributor to knowingly misrepresent a fastener sold into commerce.

Deterring fraudulent and misrepresented fasteners is sufficient to control the small percent of fasteners that are suspect. GAMA believes it is unnecessary and overly burdensome for the FQA to require NIST-registered labs and certificates of conformance. NIST-registered labs for fastener testing and test certificates/documentation would only focus the burden of compliance upon manufacturers that incorporate quality systems and produce conforming fasteners.

Reduced Paperwork

Amending the FQA to create specific penalties for fraudulent and misrepresented fasteners will do more for public safety than continuing with the current approach of NIST-registered labs and burdensome documentation requirements. The creation, processing, and storage of a laboratory test report and a NIST certificate of conformance should be eliminated.

Instead, GAMA believes that the manufacturer should maintain a record of conformance. This record would contain a description of the fastener and the standard or specifications to which the lot of fasteners has been manufactured. The record should be maintained by the manufacturer and be available upon request, but the FQA should not require the record to be distributed with fasteners. In addition, insignias of manufacturers should be recorded.

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Foreign and Domestic Manufactured Fasteners

GAMA recognizes the concern raised by the Department of Commerce report regarding foreign and domestic manufactured fasteners. We believe that reducing the requirements and burden of compliance to the FQA will address that concern.

GAMA appreciates the opportunity to comment on this important issue and looks forward to working with you as the legislation is further developed.

Sincerely,

Edward M. Bolen

President

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